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The Journal of Nervous and Mental Disease

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THE CONTRIBUTION OF PSYCHOANALYSIS TO THE MEDICAL STUDY OF BEHAVIOR

The Freud Centenary Address[1]

SANDOR RADO, M.D., D.P.Sc.[2]

This spring, all over the globe, learned societies commemorate the hundredth anniversary of Freud's birth. We, the members of this association, have dedicated our lives to psychoanalytic work based upon the foundations laid by Freud. Thus, it is in the close relationship of students to their teacher that we have assembled here tonight to pay tribute to his memory and express our admiration for his genius.

Though eventually Freud thrust forward with his explorations into the vast territory of cultural problems, primarily he was a pioneering investigator in the medical field. It is this all-important aspect of Freud's stature upon which I should like to focus your attention. In an historical perspective, I shall attempt to review his lasting achievements in the medical study of behavior and to trace the impact of his work on the development of contemporary medical thought.

The second part of the nineteenth century opened up new horizons in medicine. Schwann, Virchow, Schültze, Claude Bernard, Helmholtz, Semmelweiss, Pasteur, to mention but a few, had conclusively demonstrated that the physiological sciences, including of course anatomy, formed the much needed basis for clinical practice. Medicine was in the process of being transformed from an art into a science. The new era was splendidly represented by the Medical School of Vienna, which at that time had reached the height of its world-wide fame.

Unfortunately, the great investigators of that period, fascinated by the success of measurement and exactitude, came to view the physiological approach as the only scientific method in medicine and, accordingly, identified the organism with the theoretical construct known as the physiological organism. The material of consciousness was excluded from science because it could not be put on public display for verification. Thus, to this school of thought, the proper object of medical study was the human being without a mind. Sometimes, even the great may trespass against common sense.

It was at this juncture that Freud appeared on the scientific scene. Following up a chance observation by Breuer, he saw how essential it was to undertake a thorough psychic exploration of his patients, to be concerned with their inner life—their feelings, thoughts and impulses toward action. Medicine ignored this approach because the patient's statements were not considered trustworthy. But Freud saw that in the therapeutic situation the patient, pressed by his need for help, was willing to abandon the precautions that safeguard verbal communications in daily life and thus disclose to the physician not only his "secrets", but also material in himself of which he was previously unaware. As is generally known, he termed this investigative procedure "free association" and made it the basis of his psychoanalytic method. This discovery freed systematic medical inquiry from the limitations of the physical methods

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based chiefly on inspection; free association enriched medicine with the mental method of communicated introspection. To bring the private phase of behavior within the scope of medical exploration was Freud's epochal feat. Aside from its spectacular scientific fruitfulness, it changed the patient's status from laboratory specimen to human being and materialized in full the aphorism of Hippocrates:

> "Life is short, the Art Long, opportunity fleeting, experience treacherous, judgment difficult. The physician must be ready, not only to do his duty himself, but also to secure the co-operation of the patient."

With the new investigative tool he forged Freud accumulated a steadily increasing volume of novel information calling for interpretation and systematization. Presumably inspired by the neurological psychiatry of his university teacher, Theodor Meynert, he first made an attempt at improvising a sort of medical psychology based on hypothetical principles of brain physiology. This attempt he soon abandoned as futile. Instead, he decided to build a theory of the working of the mind, to be based chiefly upon his own clinical observations. This decision gave birth to the conceptual scheme now known as classical psychodynamics. Its groundwork may be sketched as follows.

Free association brought to the patient's mind experiences which he was unable to remember before. This observation suggested to Freud that in the mind forces and counterforces operated by way of automatic mechanisms. He called the mechanism that kept certain memories excluded from the conscious mind repression. He also saw that the counterforces of repression were directed against memories that were painful in themselves, and against wishes, intentions, and impulses that were bound to have painful consequences. From this, Freud concluded that the function of repression was to safeguard consciousness against avoidable pain.

Mental contents and activities removed by repression from consciousness continued to exist in what Freud termed the *unconscious* strata of the mind from where they were seen to exert powerful influences upon the *conscious* stratum of the mind. This established the distinction between unconscious in the *descriptive*, and unconscious in the *dynamic*, sense. Accordingly, it has become the paramount goal of psychoanalytic exploration to bring such unconscious, yet dynamically effective material into consciousness. Freud showed—and this was his second methodological feat—that this freshly liberated material could be interpreted by the method of contextual inference.

As evidenced by these early constructions, Freud applied to the material of his observations two definite, though not explicitly stated, points of view. Both were concerned with the analysis of behavior; one in terms of motivation, and the other in terms of the regulatory function of pleasure and pain. Both represented fundamental insights into the nature of Man, insights which he absorbed, apparently as self-evident, from his ancient cultural heritage.

As I have pointed out on previous occasions, Man has at all times grappled with the problem of his own nature, seeking to understand, predict and control human behavior. Archeological findings seem to indicate that prehistoric Man had evolved a craft of human relationships. Reflective thinking about behavior may have begun with the observation that men always wanted certain things and went after them. This ancient discovery led to the concept of motivation. Our predecessors learned to view themselves as charged with wishes, desires, intentions, aims, purposes, and goals that prompted them to act in certain ways. The idea of motive forces proved to be indispensable for the intellectual grasp of human behavior, for only in the light of men's motives could one understand their actions. For thousands of years, in all cultures, men of letters used the motivational framework to depict the doings of individuals and groups.

Similarly, it was known since time immemorial that man sought to repeat pleasurable experiences and to avoid painful ones. The written history of this elementary insight is traceable at least to Aristotle.

Freud was thinking in terms of motives and their relation to pleasure and pain because, more or less unwittingly, so did everyone else. Exceptions, of course, were the academic psychologists of his time who shied away from such "unscientific" notions and who were therefore unable even to touch the

problems of human behavior. This is also the reason why Kraepelin, who pinned his hopes on the experimental psychology of his time, remained restricted to clinical descriptions.

Though Freud did not invent either motivational analysis or the point of view of pleasure and pain, he had the intellectual courage to disregard academic prejudice and introduce these "popular notions" into his scientific work.

To the historian of the scientific method, it is a matter of considerable interest that Freud was hardly aware of the fact that his psychodynamics was a motivational dynamics from beginning to end; that the use of motivational analysis and the insight into the regulatory function of pleasure and pain were of ancient origin. Only in his autobiographical account of his early differences with Josef Breuer do we find a passing reference to what he thought was the source of his theoretical presuppositions: "I had taken the matter less academically; *everywhere I seemed to discern motives and tendencies analogous to those of everyday life.*" (My italics.)

Freud's eyes were focused on the investigative tools he discovered—free association and interpretation through contextual inference—which enabled him to explore man's *unconscious* mental life. It does not detract from the magnitude of this achievement if we realize that Freud's new tools worked so well because he employed them in the traditional framework of motivational understanding. Free association acted as a spearhead of motivational inquiry, and the new technique of interpretation vastly increased the scope and fruitfulness of such inquiry. The idea of motivation was familiar to everyone; its prominent use in psychoanalysis contributed in no small measure to the spread and general intelligibility of the new science.

Let me now continue the listing of Freud's basic concepts and findings. In scientific fruitfulness and development, the concept of regression came nowhere near the brilliant theory of repression. In Freud's usage, the term regression first referred to the observation that free association takes the patient's thoughts in a backward direction, from the present through the recent past to the remote past. The truism underlying this early meaning of the term is that every human being is the outcome of his historical development; therefore, to be fully understood, he must be viewed in the light of his past. Subsequently, Freud adopted the specific biological meaning of the term regression. It then denoted a partial reversion in function to an earlier stage of development or, expressed in our current technical language, an untimely reactivation of an obsolete behavior pattern.

An early product of Freud's explorations was his discovery that dreams had a hidden meaning that could be disclosed through the interpretation of the dreamer's associations to his dream. From among his achievements, this was the one he considered most nearly perfect, was most proud of, and accordingly used as the touchstone of a fellow scientist's friendly or hostile attitude towards psychoanalysis.

Indeed, at the turn of the century, it required extraordinary courage and intellectual integrity on the part of a young academician to present himself to the profession as an interpreter of dreams. Notwithstanding this scientific prejudice, he boldly set forth his insights and ideas, which were to make the interpretation of dreams the "royal road" for the exploration of the unconscious mind.

Freud saw in the dream a mechanism for the disposal of sleep-disturbing stimuli that would otherwise awaken the sleeper. The sleeping mind may be affected by sensory stimuli from the environment, by signals from the peripheral systems of the organism indicative of acute physiological needs, or by stirrings arriving from deeper strata of the mind itself. The latter show that certain repressed or suppressed psychic needs may, through confluence, gather sufficient momentum to invade the conscious stratum of the sleeping mind and force it to cope with them just as it is forced to cope with the external stimuli and the signals of acute physiological needs. The hallucinated imagery of the dream tends to settle the demand made upon the mind by way of illusory fulfillment. If this intention of what Freud called the dream-work succeeds, the demand is done away with and the organism can continue to sleep; if it fails, the organism may have a terror dream and awaken.

It was through the patient dissection of a voluminous and complex material of dreams that Freud arrived in effect at these stunningly

simple formulations. His decisive idea was to make a sharp distinction between the facade of the dream—which he called "manifest content"—and the body of underlying, background material brought to light by free association—which he termed "latent dream thoughts". He thus discovered the mechanisms that govern the processes of thinking at unconscious levels and are in so large a measure responsible for the strange and incoherent appearance of so many dreams. The matter was further complicated by the fact that the ethical and esthetic standards of the conscious stratum of the mind were able to exert some influence even during sleep. Freud personified these critical activities of the mind as the inner censor of the dream. In this light, the dream was seen as a compromise between censorship and prohibited desire. Other important elements of Freud's theory were the "day's residue" and the "precipitating occasion" of the dream. Subsequently, Freud used these mechanisms of dream formation as a model for constructing the mechanisms of symptom formation.

We shall now turn to Freud's findings in the broad area of sex. In the popular mind, sex is more intimately associated with Freud's work than any other subject. The emphasis placed in early psychoanalysis on matters sexual first shocked the sensitivities of the official medical authorities in a still Victorian Europe; but after World War I, much to Freud's own surprise, the same continued emphasis helped psychoanalysis more than anything else to capture the general reader's interest. The spread of psychoanalysis was further enhanced, and for much the same reason, by its profound effect upon the literary work of poets and writers everywhere. The gradual dissolution of Victorian morality began with the emancipation of women and was accelerated by the increasing popularity of certain psychoanalytic tenets. This cultural background makes it all the more important to examine with utmost care Freud's contribution to our understanding of the part played by sexual motivation in human life.

Before Freud, the generally accepted view was that genital life began at puberty. Through the psychoanalytic exploration of adult patients, Freud discovered that this teaching bore no relation to the facts. He saw that from the earliest age children had genital feelings and thoughts, were capable of orgastic arousal and actually engaged in a variety of genital activities. The image of the innocent child was a moralizing myth, made possible by the fact that as a rule adults have long since repressed the memory of their genital activities in childhood. Liberated through the psychoanalytic process, these memories came to light and thus permitted Freud to reconstruct the picture of the true nature of the child. Subsequently, Freud's findings were abundantly verified through the direct observation of children. Today, these findings are established facts of science and are even spreading wider and wider in the general population.

Freud also triumphed with his startling observation that genital disturbances in the child lay the foundation for genital disturbances in the adult. No scientist can any longer have any doubt about these facts.

He discovered too that men who later became dependent for sexual gratification on a mate of their own sex had in early life passed through a phase of intense sensual attachment to their mother. This finding, though originally obscured by the bisexuality myth of 19th century biology, has remained fundamental to a better understanding of what is now viewed as the reparative formation of homogeneous pairs.

Freud traced a group of acute nervous disturbances to certain self-imposed precautions in the sexual life of otherwise healthy individuals. When the practice of such precautions was discontinued, these disturbances promptly disappeared. Accordingly, the decisive etiological factor appeared to be the incomplete discharge of the accumulated sexual tensions which were thus deflected into abnormal physiological channels.

Though in recent decades medical progress in contraception and prevention of venereal disease, together with a drastic change in sexual mores, has vastly reduced the incidence of this type of sexual mismanagement, nonetheless, there are still enough cases left to prove that in substance Freud's early observations were valid. There is such a thing as a stray discharge of unrelieved sexual tensions.

Freud further observed that potency dis-

turbances in the male, frigidity in the female, were prone to precipitate additional nervous disturbances, which on the surface did not seem to have any connection with the patient's sexual life. Similar consequences developed in the wives of sexually inadequate husbands. These observations are just as valid today as they were when he first made them. However, Freud never held the view, so often attributed to him, that all psychoneuroses are the consequences of sexual frustrations.

In the pre-Freudian era, outstanding medical men were well aware of the fact that sexual problems play a large part in neurotic disturbances. But they considered these matters "secrets of the conjugal bed", which must be left untouched by the tactful physician. It is a good indication of the cultural influence of Freud's work that by now, to the younger men in the field, this attitude looks almost as incredible as the historical fact that some hundred years earlier, in some places, the obstetrician could examine a woman in labor only if she remained covered up with a blanket.

The organism may foster its sexual desire almost to the exclusion of other pursuits. Or, by restricting this desire, it may save for other purposes the mental resources which would have been absorbed by this desire. Freud saw in the latter choice a cultural advance and designated it as sublimation. On the other hand, he warned that the organism's neglected need for sexual gratification may return with a vengeance.

Freud discovered that a variety of pleasure mechanisms operate in children of every age, notably mechanisms of bodily pleasure. When he became aware of this fact, he was working with adults, tracing their sexual behavior to its infantile origins. Hence, he came to view and describe these pleasure-seeking activities of children in a sexual context. Today, we realize that the existence and importance of these pleasure mechanisms are totally independent of the chance context in which Freud happened to detect them.

The problem of sexual morality directed Freud's attention to the problem of conscience. He could show that conscience develops in early life in the child's relationship to his parents and other authoritarian personages. He saw that the most powerful motives in the evolution of conscience are the fear of punishment and the desire for the reward of loving parental care. He stated that conventional education was guilty of two grave faults: first, it concealed from the young the part sexuality will play in their lives and, second, it left them unprepared for the aggressions to which they are destined to become exposed.

Freud accumulated a wealth of clinical observations to show that the formative period of childhood has a lasting significance for the individual's entire life. He traced this fact to a biological factor. In comparison with most animals, he said, the human infant has a relatively short intrauterine existence, is sent into the world in a less finished state, remains helpless much longer, and requires a much longer period of time for maturation. This explains the human infant's excessive need for loving parental care; this need later continues as a desire to be appreciated and respected by the social group. Eventually, Freud used the term Oedipus complex in a more general way to denote "all the child's relations to both parents," or, in other words, the entire area of cooperation, conflict, love and hate in the child's dependency relationship to his parents.

In psychopathology, Freud stressed the inescapable conflict between innate drives and cultural demands. In effect, he held that anti-social behavior resulted from the failure of education to domesticate the infant; on the other hand, if the process of domestication miscarried, the price to be paid was the infant's acquired predisposition to psychoneurosis.

After clarifying certain theoretical uncertainties, Freud realized that in the etiology of the neuroses the ultimate discernible psychodynamic agent is fear. He defined realistic fear as a response to an actual danger threatening from without, and neurotic fear as a response to an unknown yet analytically discernible danger threatening from within. He discovered that under our sexual mores the boy almost universally fears punitive removal of his "offending" genital organ; he termed this previously unsuspected educational response "castration fear" and showed that its persistence in later life impairs virility. He described the defenses the organism uses against threats from within as well as against

threats from without. He revealed the power of repressed impulses to force upon the organism vicarious satisfactions and regressive gratification substitutes, which he termed compromise formations. Last, but not least, he accumulated a solid mass of empirical findings pertaining to the detailed psychodynamics of the various forms of psychoneurosis.

Freud conceived of psychoanalytic therapy as a process of re-education, devised to undo the patient's repressions and thus to lift him to a higher level of social maturity and inner independence. He realized that the patient's biography is the proper object of medical study, and insisted that the patient's emotional relationship to the physician is a crucial problem of all psychotherapy.

Let me now say a few words about the development of psychoanalysis during the post-Freudian era.

We must here distinguish between several currents. The largest group of psychoanalysts aims at preserving the conceptual structure of classical psychodynamics as intact as possible, hoping to achieve progress by a slow and gradual re-interpretation of the old concepts. Other psychoanalysts, falling into diverse groups, are profoundly impressed by the great strides made by the biological and cultural sciences since the concepts of classical psychodynamics were originated. Various attempts were made and are being made to utilize these advances for the continued development of psychoanalytic theory. I feel obligated to mention here briefly my own efforts in this direction. They were initiated with the following goals: 1) to place the analysis of behavior in the context of the biological organism interacting with its cultural environment, and 2) by increasing scientific precision, to evolve theories that can be verified or refuted by clinical observation. The study of behavior was fitted into the framework of the biological sciences by recognizing the evolutionary concept of adaptation as basic; accordingly the developing new conceptual scheme was termed adaptational psychodynamics.

In one crucial sentence in the last chapter of his "General Introduction to Psychoanalysis", Freud almost anticipated this line of development. The difference between health and nervous illness, he wrote, "is narrowed down . . . to a practical distinction, and is determined by the practical result—how far the person concerned remains capable of a sufficient degree of capacity for enjoyment and active achievement in life." Clearly, health and disease, like the survival and extinction of species, differ from one another in the degree to which success in adaptation is achieved.

Adaptational psychodynamics is based on the Freudian methods of free association and interpretation of unconscious processes by contextual inference. It continues the Freudian scheme of motivational dynamics and, in accord with Freud's pleasure-pain principle, views the organism as a biological system operating under hedonic control. It seeks to transform Freud's pioneering exploration of the unconscious mind into a well-defined method aimed at disclosing the motivational significance of non-reporting brain activity. It is to be hoped that correlated studies in physiology and genetics will eventually advance adaptational psychodynamics to a *comprehensive dynamics of human behavior*.

I believe, and I am sure many others do, that the logical outcome of Freud's discoveries will be the achievement of such a unified science of the *total* organism. Steadily increasing efforts in this direction are being made in many quarters. In order to succeed, we must and will learn to free ourselves completely from the thought habits and semantic creations of three hundred years of Cartesian dualism.

Freud himself was worried about the future of psychotherapy. "Gentlemen," he said, "we must hurry up. The man with the hypodermic syringe is on our heels." Could he be with us today, he would see that the need for psychotherapy has steadily increased. Moreover, by now it has become obvious that all treatment procedures in every branch of medicine must of necessity include a psychotherapeutic component, or at least be administered in a psychotherapeutic framework. It is no longer considered sufficient for the physician to have good bedside manners. We are approaching the time when all physicians will be trained

in scientific psychotherapy, based on the knowledge of psychodynamics.

After the temporary limitations of 19th century medicine, we are thus reverting to the ideal of Greek antiquity, which was to treat always *both* mind and body. But we seek to do this at the scientific level, on the basis of the concept of total organism. The latter is viewed as an indivisible unit capable of being explored and managed in a complementary fashion by both psychodynamic and physiologic methods.

In medicine, Freud's discoveries are destined to bear fruits infinitely richer than he himself had ever hoped.

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PROGNOSIS IN HEAD INJURIES IN CHILDREN

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In this era of antibiotics and mass immunization, infectious diseases recede while accidents move steadily up the scale in morbidity and mortality tables. Dietrich (5), in a recent survey of the problem, reports that accidents now account for one-third of the deaths in children. Accidents involving injuries to the head take an especially heavy toll. Statistics from general hospitals show that, except for fracture of the forearm, head trauma occurs twice as often as any other type of injury in children, and even ranks with appendicitis as an admission diagnosis (1). While the treatment of the acute effects of head injury falls within the province of medical and surgical practitioners, post-traumatic sequelae commonly come up for psychiatric assessment.

This paper complements a previous report on head injured children in which the emphasis was on factors which predispose children to head injury (6). This contribution represents an effort to examine and evaluate those factors which ultimately affect the prognosis of head injuries in children.[2]

Brain Damage

In apparent contradiction to the clinical axiom that all traumata which strike early in life, during the period of greatest vulnerability, have a worse prognosis, children are said to withstand head injury better than do adults (15). Anatomical differences may account for the difference (9); the cranial bones, being membranous, are more elastic, absorb shock better and have less tendency to fracture, the dura mater adheres to the skull and limits extradural hemorrhage, and the absence of deeply grooved beds for the meningeal veins diminishes the likelihood of hemorrhage in inner table fractures. Nevertheless, head injury, when associated with damage to vital brain structures, is attended by a high mortality rate, with death usually occurring immediately or shortly after the accident. Children who survive trauma to the head, those who escape extensive cerebral pathology, usually recover completely, according to surgical reports. Beekman (2) found permanent residuals in only 5 per cent of his cases, and these were children who had been severely injured. The association of brain damage with sequelae is so commonly observed in clinical follow-up studies, that it deserves primary consideration in prognosticating head injuries.

Fracture of the skull is only presumptive evidence of brain injury. Extensive fractures may occur, and yet the encased soft tissues may be spared, while, on the other hand, gross brain pathology may be seen at autopsy despite the fact that the skull is intact. In cases of compounded comminuted depressed fractures, with skull deformities where bone fragments are driven into the brain producing laceration and hemorrhage, direct observation of lesions or the clinical condition of the patient will attest to the damage to vital tissues. Patients who are severely traumatized may remain comatose for long periods. With recovery, neurological evidence of brain injury is apparent in the form of paralyses, aphasia, or loss of other functions. In time as healing progresses through connective tissue replacement and scarification, other pathological sequelae crystallize out. Post-traumatic epilepsy is a crippling aftermath, appearing abruptly or after an interval of months, and characterized either by a single type or by combinations of seizures, grand mal, petit mal and Jacksonian. Massive repetitive convulsive attacks often bring in their wake intellectual deterioration; post-traumatic deterioration can occur, however, as an isolated complication in the absence of epilepsy.

Excluding for the moment the acute deliria observed immediately after injury, the existence of chronic post-traumatic psychoses is a debatable issue (14). We are omitting here a consideration of those cases in which the head injury is one of many possible traumatic life experiences which can trigger off the outburst

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[2] The clinical and follow-up studies of cases were made on the Children's Ward, Bellevue Psychiatric Hospital; Dr. L. Bender, Senior Psychiatrist.

of a latent psychosis. But there can be little question that varying degrees of behavioral disturbance, in severe cases sometimes approximating psychotic states, are observed in children who have suffered severe brain injuries. The clinical picture is akin to that described by Goldstein (8) in head injured soldiers. His patients made a relatively good adjustment as long as they were sheltered in an institution where they were spared stressful life situations. Even in the institution, the introduction of unexpected stimuli, changes of any order, precipitated catastrophic reactions, profound shock-like states of withdrawal. In severely traumatized children, one sees extreme emotional instability and limited reserves; they are given to impulsive and explosive outbursts of cruelty, assaultiveness and destructiveness, as well as uncontrolled criminal and sexual activity. Unless they are afforded a protective environment, they come into conflict with society.

T. H., at age 4, fell from a first story window and sustained a compound skull fracture. At 6, he was in an automobile accident and again fractured his skull, had a convulsion, aphasia and right-sided paralysis. Two years later, with the persistence of Jacksonian seizures, he was explored. An area of degeneration was discovered in the left frontal lobe in which spicules of bone were still lodged. For some months following this operation his convulsions subsided and then recurred periodically. When his behavior became unmanageable, he was admitted to the Children's Ward at Bellevue Psychiatric Hospital where a relentless drivenness in activity was observed. He stated that he was aware of his difficulties, which he related to his head injury, but that he was unable to maintain control. Several attempts to keep him at home failed. Later admissions were on court order because of stealing, and he was finally remanded to a state hospital, where he was later observed in a follow-up visit and found to be withdrawn and sullen. Convulsive seizures were now infrequent.

G. G., at age 8 years, was struck by an auto and suffered comminuted fractures of the skull extending into the base. Initially unconscious for weeks she remained critically ill for months. Convulsions occurred from the outset as well as a hemiplegia. Psychiatric evaluation was sought three years later because of unruly, aggressive outbursts, enuresis, as well as other infantile traits and persistence of epileptic attacks. Positive neurological and air encephalographic findings were noted. Her I.Q., formerly in the average range, was now borderline and constantly deteriorating.

Before making the diagnosis of a post-traumatic sequel, whether it be epilepsy, deterioration or an organic behavior disturbance, it is well to make a careful investigation of the pre-traumatic history. It is worth recapitulating what was emphasized in the preliminary report (16). Originally the series of cases included 86 children, all of whom had suffered post-natal head injuries of sufficient severity to fulfill Kennedy's (11) criteria. Twenty-one were eliminated because of the discovery that their clinical deviations antedated their injuries, in 8 cases it was mental deficiency, 5 had been epileptic, 6 had pre-existing organic brain disorders, and 2 had been psychotic. In several instances the pre-existing pathological condition clearly contributed to the accident. Epilepsy particularly may have beclouded origins. A child at the time of his *first* seizure unfortunately may be perched on a height or be in the path of a moving vehicle. Later convulsive attacks may be mistaken for post-traumatic sequelae. I recall the case of a child whose condition had been diagnosed as post-traumatic epilepsy. Some months later an older brother spontaneously developed seizures. Hereditary and constitutional elements can also contribute to and shape sequelae.

In time, the laboratory and clinical signs of brain damage are erased. Fracture lines disappear, and neurological findings melt away; encephalograms become equivocal, and psychological tests, offering less specific evidence of organicity, are also open to question.

The diagnosis most commonly made in the psychiatric screening of head injured children is "post-traumatic syndrome". Many clinicians emphasize the organic substratum in this condition despite the frequency with which there is a paucity of positive clinical and laboratory findings and an absence of the more severe complications such as epilepsy or deterioration. Blau (3) indicts a particular brain area, the frontal region, as the decisive site of injury which is productive of the post-traumatic syndrome. Several investigators (10, 13) have pointed out the resemblance of the syndrome to the infectious encephalopathies. But the syndrome also closely parallels the clinical picture of psychopathic personality, and, in some cases, the argument of the existence of covert organicity is offset by evidence in the history of psychopathic behavior which antedated the head injury.

H. C., at age 10 years, was in an auto accident in which he sustained a skull fracture. Thereafter he manifested personality and behavioral difficulties culminating in felonious antisocial acts. At 20 years of age he was an inmate of a penal institution. A review of his early history, however, revealed clear evidence of psychopathic behavior dating back to his sixth year, and continuing to the time of his head injury.

Traumatic Neurosis

Injuries to vital body parts, such as the head and genitals, arouse profound psychological reactions. Such injuries flood the personality with anxiety usually beyond the individual's capacity to adequately cope with it or bind it. Traumatic neurosis (7), first described in World War I, became the model for parallel clinical conditions observed in civilians. The clinical picture includes emotional lability, physical and work incapacitation, a multitude of anxiety symptoms and the monotonous recurrence of the same anxiety dream in which the individual is confronted by the same threat of annihilation which first precipitated the neurosis. This picture is not duplicated in children, but many of its features may be noted.

T. T. was concussed for two weeks following an auto accident at age 7, in which his face was scarred. He was later involved in antisocial acts, concerning which he expressed considerable guilt. He suffered from nose bleeds and headaches. At age 20, he continued to have strong emotional reactions to his facial scars, felt self-conscious and expressed feelings of inferiority. Occasional headaches and dizziness made him ruminate about his accident.

Other anxieties are displaced to the injured organ. Feelings of inferiority and castration threats are lodged there and reinforced by hypochondriacal feelings.

D. F., at age 7, was hit by a truck, rendered unconscious, and found to have suffered a skull fracture. Seven years later he was still complaining of headaches, dizziness, and nausea frequently ending in vomiting. He was very sensitive, flaring up if he was crossed, and tyrannized his family. His mother had been told to be careful with him, to "give in to him" on every score. He complained about the back of his head, which he said was very sensitive and claimed that he had to be very careful to avoid having it touched. He also suffered from night terrors.

Head Injury, an Incident in the Personality Profile

The vast majority of children who sustain head injuries fall into neither of the two categories mentioned above. A relatively small percentage of injuries result in brain damage which gives rise to severe sequelae. Traumatic neuroses are less frequent in children than in adults. In most of the cases the head injury is but an incident in the life profile. So frequently, in children who are screened psychiatrically, the injury is one of many, and while the sequelae are not striking, the factors militating for accident proneness are arresting. A history of multiple accidents is quite common in these children. If reared in an atmosphere of rejection, abandonment and violence, the predominant personality pattern is one in which anxiety itself is erotized and masochistic trends are outstanding. These children play with and continue to experiment with danger. The prognosis sometimes follows an inexorable line.

A. H., at age 9, was hit on the head by a brick, vomited and became stuporous. His life story was one of total rejection and neglect. His father, chronically addicted to alcohol, deserted the family and later wound up in a state hospital as a paretic. His mother, also an alcoholic, was a prostitute who hid nothing from her children. At age 16, A. H. was killed in a fight over a girl.

By way of contrast, where there is support, even major defects in physical structure and personality can be stabilized. This holds true for those children belonging in the category of organic defects as well. Bond (4), as well as Price and Putnam (12), has reported similar experiences with post-encephalitic and epileptic cases.

S. M., at the age of 8 years, was injured in an automobile accident. His condition was so critical that he was given last rites. He recovered, but extensive brain damage was later found by neurological and encephalographic examinations. When seen during adolescence he was restless, withdrawn, complained of nightmares and somnambulism, and occasional convulsive seizures. He was operated for adhesions of the dura and was left with a large skull defect. Re-examined at age 23, he still had positive neurological signs including an irregular and sluggish right pupil, nystagmus to the left, and slight right facial weakness. He was sensitive about the scars on his forehead and had his hair cut in a special way to conceal them. He declared that he was unable to do heavy work. Since his coordination was poor, he constantly dropped things. But, S. was satisfied with his progress. He was remarkably cheerful, friendly and optimistic about his future despite his difficulties. He was pursuing a career as a singer after working hours. He was engaged and was soon to be married. In the background was a devoted mother who had sup-

ported him throughout his long difficult road and to whom he attributed his ability to make his way in spite of his handicaps.

Summary

In children who suffer head injuries in which extensive brain damage results, and profound complications such as epilepsy, deterioration or severe organic behavior reactions develop which disorganize the personality by vitiating the ego's controls, the outlook is poor.

Of importance in evaluating the ultimate outcome in all cases, except in those debilitated by massive brain defects, are the pre-traumatic personality, environmental pressures, and the presence or absence of strong familial and other positive relationships. These influences will determine whether there will be repetition of self-destructive pattern, neurotic entanglement and fixation on the injury, or the ability to surmount adverse life experience, to continue to grow and to make an adequate adaptation.

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PSYCHOBIOLOGICAL IMPLICATIONS IN INSULIN THERAPY WITH CHILDREN

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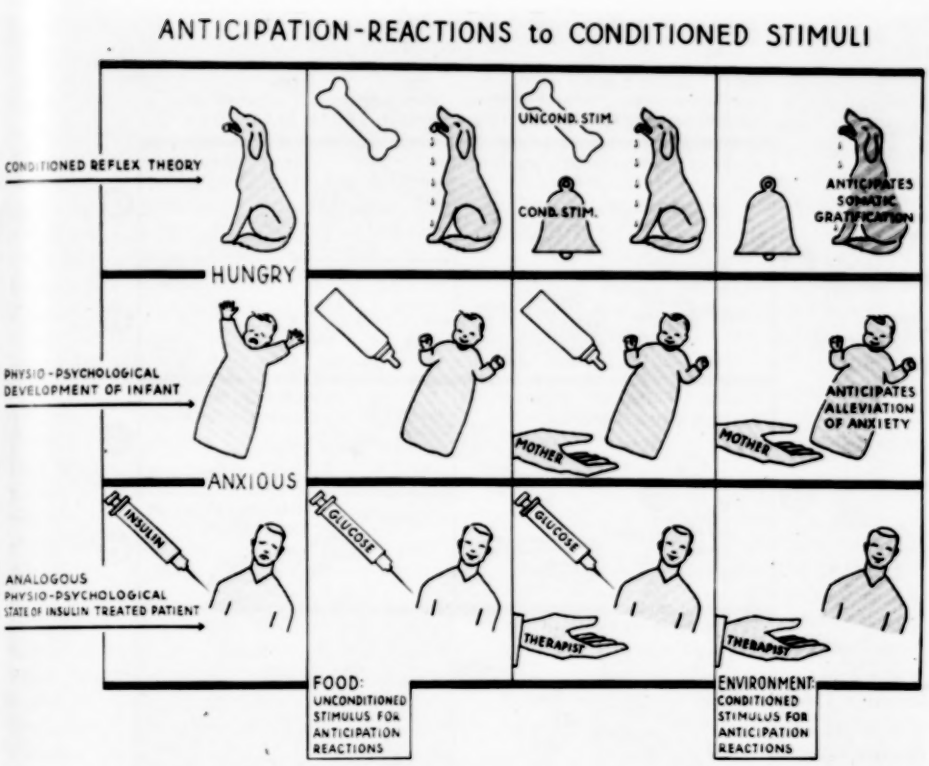
There are few publications on the subject of insulin treatment with children. It would not be surprising to find that unsatisfactory results at previous treatment attempts have caused such a gap in the literature. One of the factors responsible for past failure of insulin therapy in children may be that the action of this drug is not, as yet, clearly understood. Very small doses of insulin have a stimulating effect, preferably used in improving appetite. Larger doses paralyze activity by depriving the organism excessively of the necessary fuel of carbohydrates. This action causes the "sedating" effect of insulin and can be confused with the psychotherapeutic effect of insulin which occurs simultaneously. The psychotherapeutic effect of insulin is based rather on its ability to create anxiety which is eventually alleviated by intake of food. In inducing this particular anxiety reaction actually only a natural cycle is initiated which occurs most marked in the post-natal period.

An explanation for this phenomenon can be found in a model described in some detail below. There Mirsky combines his own biological concept of neonatal development with Benedek's and French's concept of psychological development of the infant. In the model presented, a sequence of events is described which is initiated by a fall of blood sugar immediately after birth. It then is postulated that the resultant hypoglycemia produces manifestations of hypothalamic activation like respiratory and vasomotor changes, increase in uncoordinated motor activity, gastric activity, and so forth. This sequence of events following dimunition of blood sugar also produces what is referred to as physiological tension and biological anxiety. However, with ingestion and absorption of food the blood sugar returns to normal, the effects of hypothalamic activity subside, and there is decrease in gastric activity, decrease in uncoordinated motor activity and so on until sleep usually ensues. This cycle of hypoglycemia, hypothalamic activation, somatic gratification and lessening of tension and anxiety gradually leads to the recognition that release of internal tension and alleviation of anxiety have their origin in the external environment. Recognition is made possibly only by associating responses of the perceptory system with somatic responses to ingestion of food and restoration of physiological equilibrium. Preliminary to feeding, the infant sees, hears, smells and feels the mother who by picking him up and feeding him creates external sensations which are associated then with the following process of somatic gratification. In introducing here one more concept, namely that of the conditioned reflex (table 1), it can be easily deduced that having experienced this cycle for a sufficient length of time, the newborn will anticipate somatic gratification to stimulation of his sensory system only and without having received food.

In order to aid the infant in associating his sensory impressions with his somatic responses, the presence of a mother with adequate integrating capacity is needed, or more simply expressed nothing less than motherly love is needed. If with the mother's aid the above cycle is successfully established, a sense of confidence and security ensues, or, in other words, the primary transference results which permits the child to respond with greater equanimity to stimuli of his social environment. It is through such primitive, animal type of learning that the infant establishes the primary transference or first social relationship.

In previously described conditioned reflex setting, biological anxiety is alleviated by food which is the natural unconditioned stimulus and is associated with the mother who is the natural conditioned stimulus. If the conditioned stimulus, however, is inadequate, there will not be establishment of a proper primary transference, and consequently there will not be either alleviation of biological anxiety or conveyance of psychological security. The child will remain anxiety ridden

TABLE 1



The *top strip* illustrated the classical conditioned reflex setting. The dog seeing food anticipates somatic gratification and starts salivation. Associated with the food is the sound of a bell which some time later will alone bring about anticipation of somatic gratification and salivation.

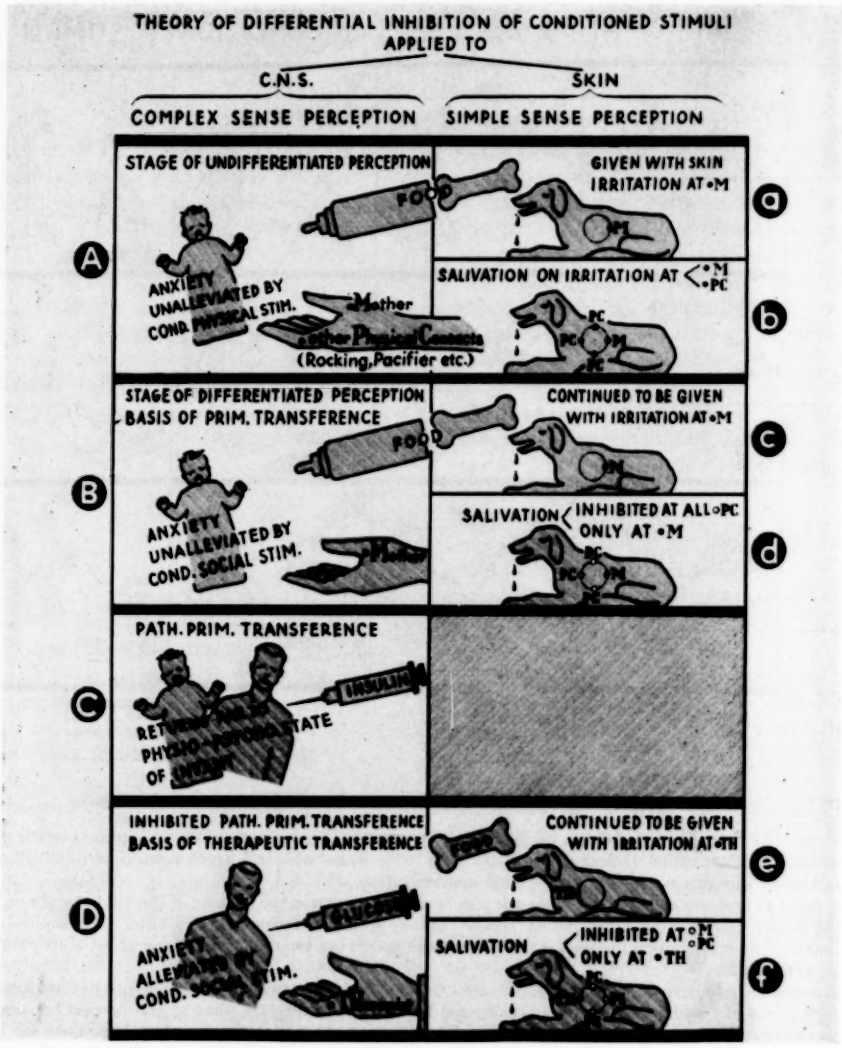
The *center strip* shows the newborn being not only hungry but anxious too because of the vital threat resulting from the sudden drop of blood sugar. Seeing food he not only anticipates somatic gratification but also alleviation of his anxiety. Associated with the food is the mother who some time later alone will bring about anticipation of alleviation of anxiety.

The *bottom strip* indicates that the insulin treated patient too is not only hungry but similarly threatened by the sudden drop of blood sugar. On receiving glucose he not only anticipates somatic gratification but also experiences alleviation of anxiety. Associated with the procedure is the therapist who some time later alone will bring about anticipation of alleviation of anxiety. This strip, however, indicates only the promotion of the therapeutic transference. The inhibition of the pathological primary transference is demonstrated later.

(One more strip could be added here for the recently introduced mescaline-chlorpromazine treatment. Severe anxiety caused by mescaline is alleviated by chlorpromazine, and the therapist associated with the drug will some time later become alone an anxiety alleviating conditioned social stimulus responsible for a therapeutic transference. The potential danger of this type of drug therapy is an incomplete transference phenomenon resulting from a deficient or lacking conditioned social stimulus. Drug dependency and addiction is then a potential outcome of such inadequate therapeutic situation and as a matter of fact has already been reported in some cases treated with chlorpromazine.)

and labile in response to stimuli from his social environment. Therefore, an inadequate transference experience is responsible not only for interfering with the fundamental process of social learning but also is an inadequate basis for subsequent identification processes which are a more mature and human form of social learning. The result is the emotionally dis-

TABLE 2



Right side of table shows experiment substantiating Pavlov's theory of diff. inhibition of cond. stimuli

a) The dog seeing food anticipates somatic gratification and starts salivation. Later, irritation of skin point M is associated with food given.

b) After some time irritation at point M will cause salivation without food being given. However, irritation of other skin points PC will also cause salivation without food being given.

c) Having resumed feeding with irritation of skin at point M for some more time.

d) The dog will salivate on irritation of point M only, and salivation at all other points will be inhibited.

e) Following some more feeding but now with irritation of skin at point TH.

f) The dog will salivate on irritation of point TH only, and salivation will be inhibited also at point M.

Left side illustrates the application of this concept to insulin therapy

A) The newborn sees, hears, feels, etc., the mother (M) who feeds him. Despite this he perceives her as physical contact (M = PC) only. Rocking (PC) or sucking a pacifier (PC), etc. will substitute the conditioned physical contact which the mother represents and will alleviate anxiety.

turbed child whose social learning and general maturation are retarded or deviated, causing his immature and infantile behavior.

The emotionally disturbed child should, however, resume social learning and adequate behavior as soon as it would be possible to modify the inadequate primary transference by means of a therapeutic transference. Undoubtedly, the difficulties of materializing such objective, with psychotherapy only, are well known. Having already pointed out that establishment of a primary transference could be considered as a specific instance in the conditioned reflex theory of learning, it seems that a solution to our psychotherapeutic problem can be found in one of Pavlov's elaborations of this theory. In his concept of differential inhibition of conditioned stimuli (table 2), Pavlov asserted and proved experimentally that "When from any definite agent a conditioned stimulus is elaborated, at first, all similar and related stimuli have a similar effect. But when the chosen stimulus is repeated many times all other stimuli become ineffective." In adopting this theory for our purpose, we can apply it by creating artificially, through insulin, the same setting as it exists most pronounced in the post-natal period. In this situation a newly introduced conditioned stimulus corresponding to the therapist could compete with the original conditioned stimulus corresponding to the mother. If this procedure is repeated with adequate frequency and intensity, it not only renders the primary transference ineffective but simultaneously facilitates a therapeutic transference and a new basis for social learning and behavior.

This quite helpful combination of several concepts not only sheds some light on the process of social learning but also on the correlation of the physiological and psychological pathogenesis of behavior disorders, and further is suggestive as to the mode of action of insulin treatment which strikingly facilitates a therapeutic transference in children who previously had for months resisted attempts at establishing any sort of relationship. Insulin artificially creates a situation which likens the physiological and psychological situation of the post-natal period as described above, and doubtless causes a disturbance of the physiological equilibrium to the extent that there is a threat to biological survival unless there is salvation coming from an external source. The therapist, at first a mere catalyst in this recapitulation of an historic experience, has, however, created a situation in which he rather easily can resume the original parental role. From this position and in the same situation as it existed at the time of the child's formation of his primary transference, any retardation or deviation of social learning having occurred then can be worked out now by a corrective emotional experience.

On this occasion, it seems relevant to include in the discussion insulin's ability of producing convulsions. Mental and emotional organization of a disturbed child is still and almost exclusively allied with its primary transference experience. Any indiscriminate disorganization of the primary transference complex disorganizes not only the pathological organization but leaves the child without substitute organization, consequently leaving the child without basis for social learning and maturation. Convulsions, in general, as well as those produced specifically by insulin or electric shock therapy, will cause such indiscriminate disorganization. Though there may be temporary improvement, through disorganization of a primary transference complex responsible for unalleviated anxiety, basically the child's condition is bound to relapse and regress. Highly discriminate use of convulsive therapy combined with insulin treatment, however, will in extremely resistive cases facilitate the psychotherapeutic process elaborated above under the theory of differential inhibitions.

B) As soon as the infant not only will perceive but also recognize his mother who feeds him, he will establish her as the only conditioned stimulus (M) which will alleviate his anxiety.

C) If the mother, however, has not established herself as a proper anxiety alleviating conditioned stimulus (M), years later, the therapist can inhibit this inadequate conditioned stimulus (M) with insulin therapy. At first, by dropping the blood sugar of the patient insulin creates a physiopsychological situation as it exists in the newborn.

D) Subsequently, the therapist (TH) by feeding the patient establishes not only a therapeutic transference (TH) but inhibits also the pathological primary transference (M).

In closing it may be emphasized that insulin therapy rather facilitates than eliminates psychotherapy. Combined treatment represents a psychobiological treatment unit, with insulin therapy taking effect on a biological level and psychotherapy on a psychological level. Thus, insulin therapy in modifying deviations inaccessible to psychotherapy only establishes a basis for psychological reorganization. Actual social rehabilitation, though, still remains the exclusive domain of psychotherapy inasmuch as time and effort hardly ever will be expandable in any process of social learning and adaptation.

Equally emphasized should be the fact that insulin therapy employed in children offers a useful experimental setting for study and verification of the various highly contested theories of fundamental and more mature forms of social learning.

In support of the above working hypothesis the following clinical material is presented. It consists of a brief case report and a series of drawings by Beverly, a 9-year-old girl, who among several other children had successfully undergone a course of ambulatory insulin treatment. Drawings, being a tangible expression of psychological activity, are employed here in analogy to Pavlov's use of gastric secretion as measurable expression of organic activity.

Case Report

Family history. Beverly's mother, a 28-year-old, tall, soft-spoken and well-dressed woman, admitted frankly that all her life she has been an unstable and stubborn person who repeatedly has threatened and attempted suicide. In 1940 she had married Beverly's father, a 39-year-old, husky man. The marriage has been an unhappy one because of her husband's drinking. She describes her husband as a "gentleman as long as he isn't drunk; however, as soon as he drinks, he breaks windows, furniture, cuts himself up with pieces of broken glass and threatens to kill himself and his family."

There are nine children from this marriage. Two children are older than Beverly, the oldest being eleven, and six children younger than she, the youngest being about one year of age. All of these children are described as having "bad tempers". Michael, the oldest child, is excitable to the extent that he becomes delirious, and the other children get so angry that they turn blue, pass out or run a high temperature.

Personal history. Beverly was born November, 1943. Of all the children she was the only one who lived most of the time with the maternal grandparents. Her developmental and behavior pattern was considered as fairly normal until about 3 years of age when her mother insisted on removing the child from the grandparents to her own home. However, every time the marriage broke up, Beverly's mother returned with her to the grandparents with whom they stayed until the next reconciliation.

Onset. About October, 1952, Beverly's father was arrested and detailed in Riker's Island, and this time the mother abandoned all her children who had to be placed in various childrens' shelters. There Beverly became extremely disturbed and attempted to harm herself and others. She was hyperactive, excited and destructive; she hit herself on the head with a heavy chair, cut her neck and wrist, threw objects around and struck counselors and nurses. She had rapid mood swings ranging from being affectionate to being abusive and apologetic. Once she punched holes in pictures of Christ, and after tearing them up she intermittently said that she loved and hated him and felt sorry for what she was doing to him. She was unable to participate in games and ran around until exhausted. She was easily distracted toward adults, forcibly asking their attention. She was disruptive in school and once broke into an unprovoked spell of laughter and crying, trying to kick and bite the principal. Following this episode, Beverly was admitted to Bellevue.

In Bellevue she essentially exhibited the same behavior as described above. She was extremely disturbed, destructive and self-destructive, requiring frequent sedation and restraint. After about 2 months of observation, she was diagnosed as childhood schizophrenia and was transferred to Rockland State Hospital's children's service.

On admission here in January, 1953, Beverly was extremely overactive, kicked doors, did not pay any attention to the doctor admitting her and showed a minimum of emotional response. Her answers were fairly rele-

FIG. 1. For 5 months following admission

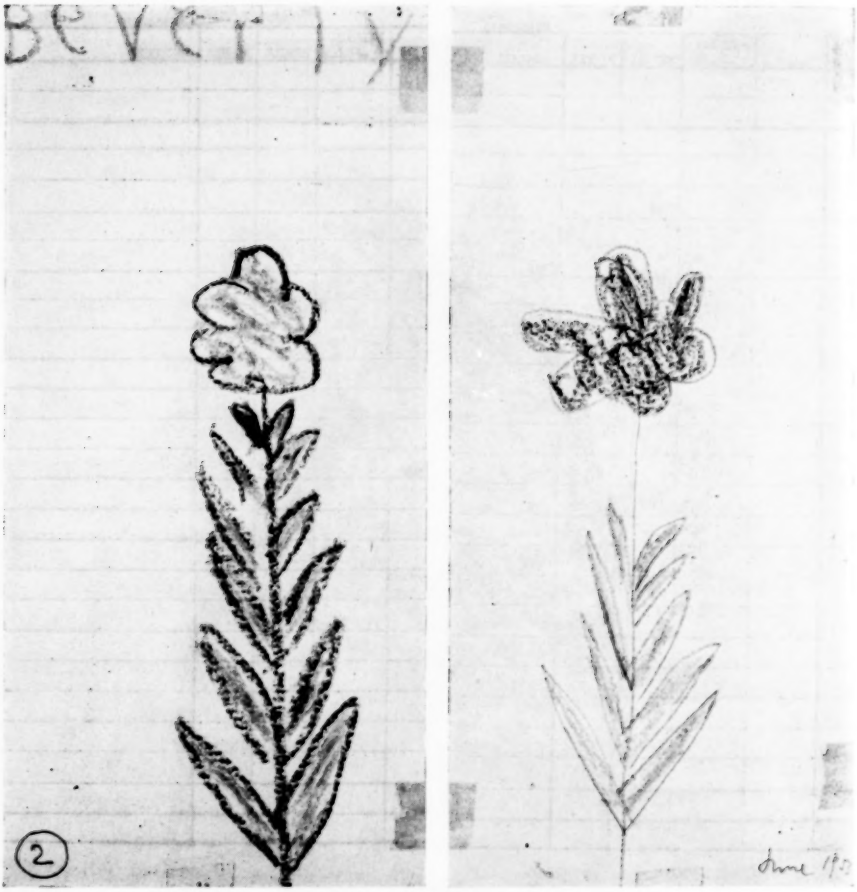


FIG. 2. After the 5th month of psychotherapy

vant, and she seemed to be in good contact. Immediately after her admission she required heavy sedation and restraint because of her assaultive and destructive tendencies. During the following 5 months the child continued to have prolonged episodes of extremely disturbed, destructive and self-destructive behavior. During this period both this therapist and staff members, having daily contact with her, spent a considerable amount of time in an attempt to establish some sort of relationship. However, as time passed on, the failure of all our efforts became quite obvious. The situation became worse instead of better, and the child then was considered as becoming a serious menace to her own safety as well as to the safety of the other children and staff.

About this time, on June 11, Beverly was started on ambulatory insulin treatment for a 5-week period. Considering Beverly's preceding resistance to psychotherapy, on this occasion, no further time-consuming effort was made in this direction although this therapist saw and talked to her daily for a few minutes at about the peak of the physical insulin reaction, which then was terminated by a delayed breakfast. Shortly after being started on treatment, Beverly's overactivity and aggressiveness subsided considerably. She appeared more relaxed and much less in need of rigid controls. Not only was she more compliant, agreeable, and quiet, but she also accepted remarkably well criticism and limitations. On the other hand, there was a passing period of

FIG. 3. Drawn on same day

marked regression to more infantile habits, as for instance to thumb-sucking and violent rocking on the floor.

During the year following the ambulatory insulin treatment the child has made slow but steady progress. In dealing with the child it has been less and less necessary to resort to restraining techniques, and she has taken a sincere interest in trying to achieve. She gets along well with the other girls, relates well to adults and accepts criticism limitations reasonably well.

Beverly still has disturbed episodes, but they are rare, short-lived and can be managed by ordinary means of control. Prior to insulin treatment the child's episodes essentially

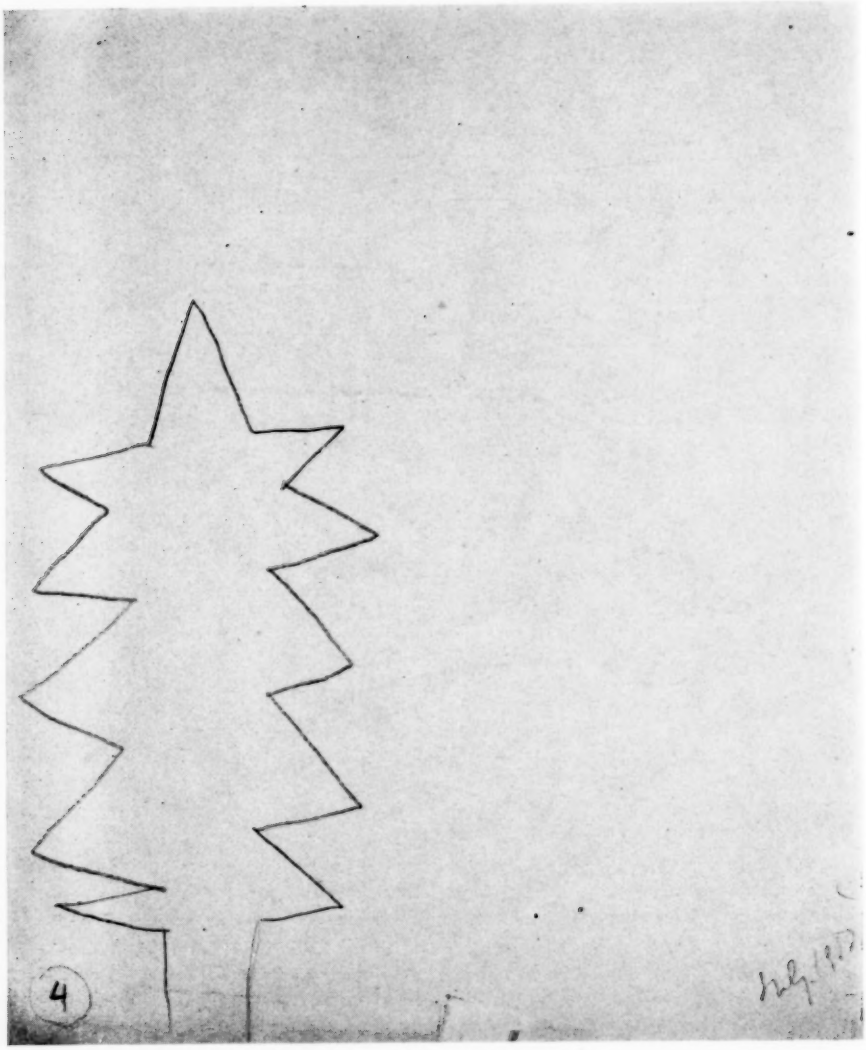


FIG. 4. Ambulatory insulin treatment

seemed to be an expression of sustained anger resulting from the obsessive preoccupation with her frustrating home situation. Current markedly modified episodes, however, coincide with situations creating anxiety about potential loss of relations previously rejected until insulin therapy was instituted. This significant change, involving also the resumption of social learning and general maturation processes, can be easily traced in the following series of Beverly's drawings.

DRAWINGS

For 5 months following admission Beverly received intensive individual psychotherapy. During this period all her spontaneous drawings were reproductions of this picture (figure 1): A house with a flower to the left and another flower to the right. The drawings are expressions of the child's obsessive preoccupation with her frustrating home situation. Symbols will be interpreted in subsequent drawings.

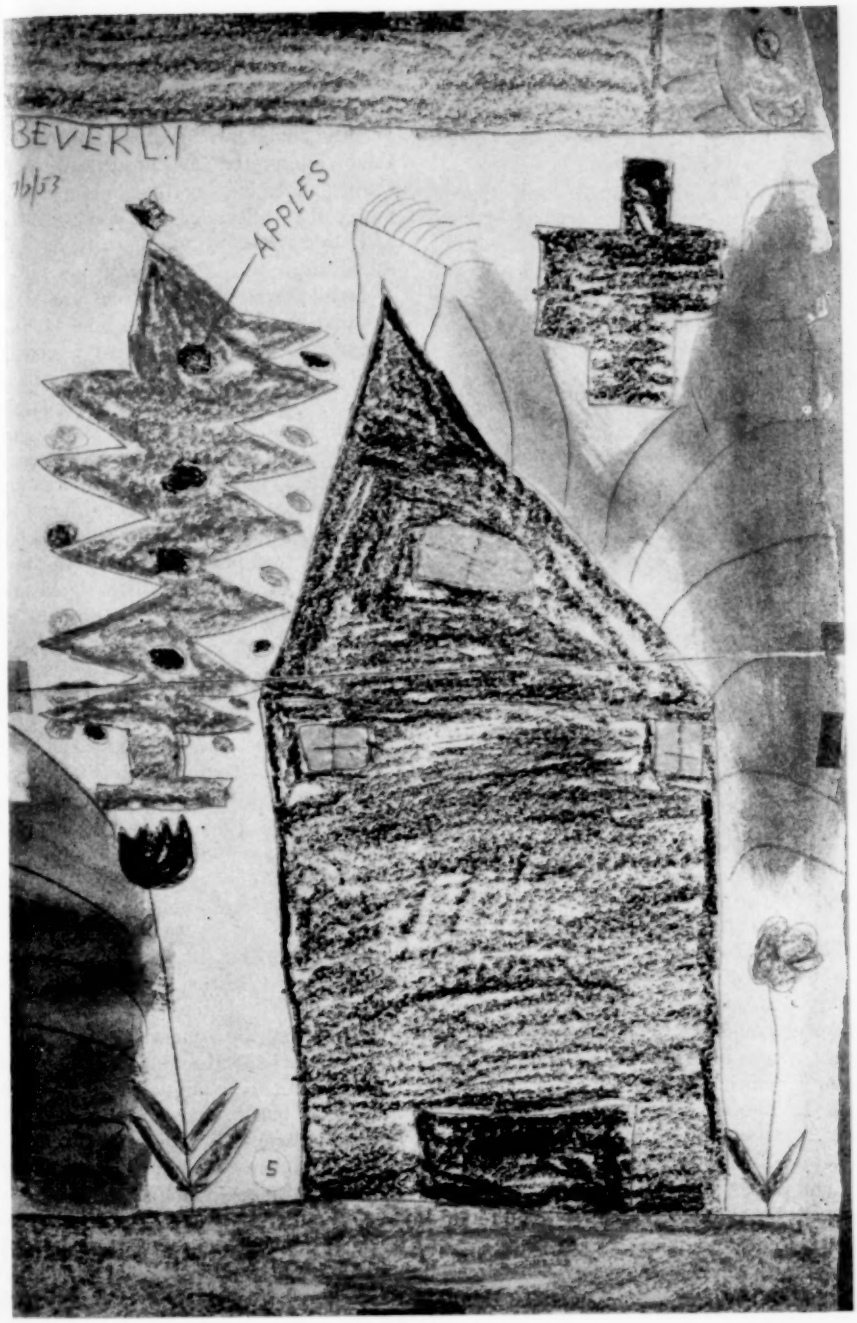


FIG. 5. The following day

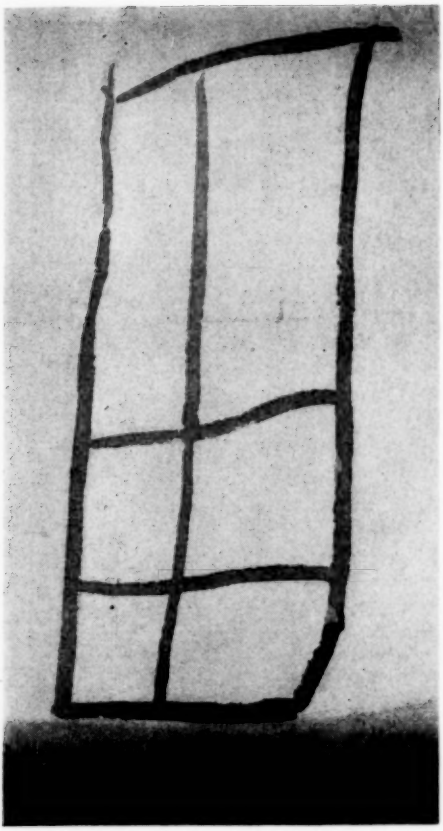


FIG. 6. Following an insulin convulsion

After the 5th months of psychotherapy there was still no psychotherapeutic relationship established. Therefore a review of the entire transference situation seemed indicated then. Beverly was specifically asked to draw something she would like to give her parents. In response she produced these two flowers (figure 2) which are similar to the flowers in figure 1. The left flower, dedicated to her father, was kept in an angry red and topped by Beverly's name in the same color (indicating ambivalent identification). The right flower, dedicated to her mother, was in more natural colors, though this was the only spontaneous drawing Beverly ever missed signing with her name (indicating lacking identification).

Figure 3 was drawn on same day as figure 2, and produced on specific request to draw a picture of the cottage mother. There is little doubt that this face of a nurse expresses oral aggression. Beverly's constantly disturbed and disruptive behavior could not be unlimitedly tolerated in a group situation. It required frequently some sort of correction which the child interpreted as unjustified hostility. Consequently, the cottage mother increased rather than alleviated the child's frustration and thus became an unsuitable parental substitute.

Ambulatory insulin treatment was started 5 months after admission. On June 11, the first 5 units of regular insulin were given, and subsequently the dose was gradually increased until by July 16 treatment was terminated with 40 units. *After the second week on insulin* Beverly still drew her stereotypic pictures. About then, the therapist (who was still an uncontaminated potential conditioned stimulus for a therapeutic transference) doodled a Christmas tree, inducing Beverly to copy it as seen here in figure 4. (The significance of associating the tree with the therapist will be seen in figure 5.)

The following day at the peak of the physical insulin reaction Beverly appeared extremely uncomfortable and apprehensive. In order to divert her attention she was asked to draw some pictures. The result was this drawing (figure 5) which shows a unique simultaneous appearance of past (2 flowers) and recent (sun and tree) conditioned stimuli, mixed with symbols (cross and clouds) suggestive of threat to biological survival (anxiety reaction to hypoglycemia). This was the only time that Beverly painted a black cross with ghostly clouds and a Christmas tree (as suggested by the therapist the day before) with apples (food). These just mentioned symbolic expressions correspond to the previously outlined concept of an acute physiological crisis created by lowered blood sugar and alleviation of this internal distressing situation through food coming from an external source, namely the therapist. The competing appearance of all of these symbols under the stress of a hypoglycemic state is demonstrated. The anxiety relieving food is clearly associated with the Christmas tree representing the therapist. Having this situation frequently and intensively enough experienced, the therapeutically introduced conditioned stimulus

FIG. 7. About 2 months after termination of insulin treatments

will prevail, eliminating all other conditioned stimuli as postulated in the theory of differential inhibitions. This change is demonstrated in figure 7.

Following an insulin convulsion Beverly displayed a partial amnesia. This drawing (figure 6) was spontaneously produced *2 weeks after this convulsion*. This was the only seizure the child had, and subsequent treatment was terminated. The drawing is suggestive of a then still existing amnesia. This seems to be indicated by the vague, atypical outline of the house and the missing transference symbols persistently drawn prior to insulin treatment. Concluding from this picture, it seems highly suggestive that insulin convulsions may disorganize an acquired pathological transference complex, thus aiding the establishment of a

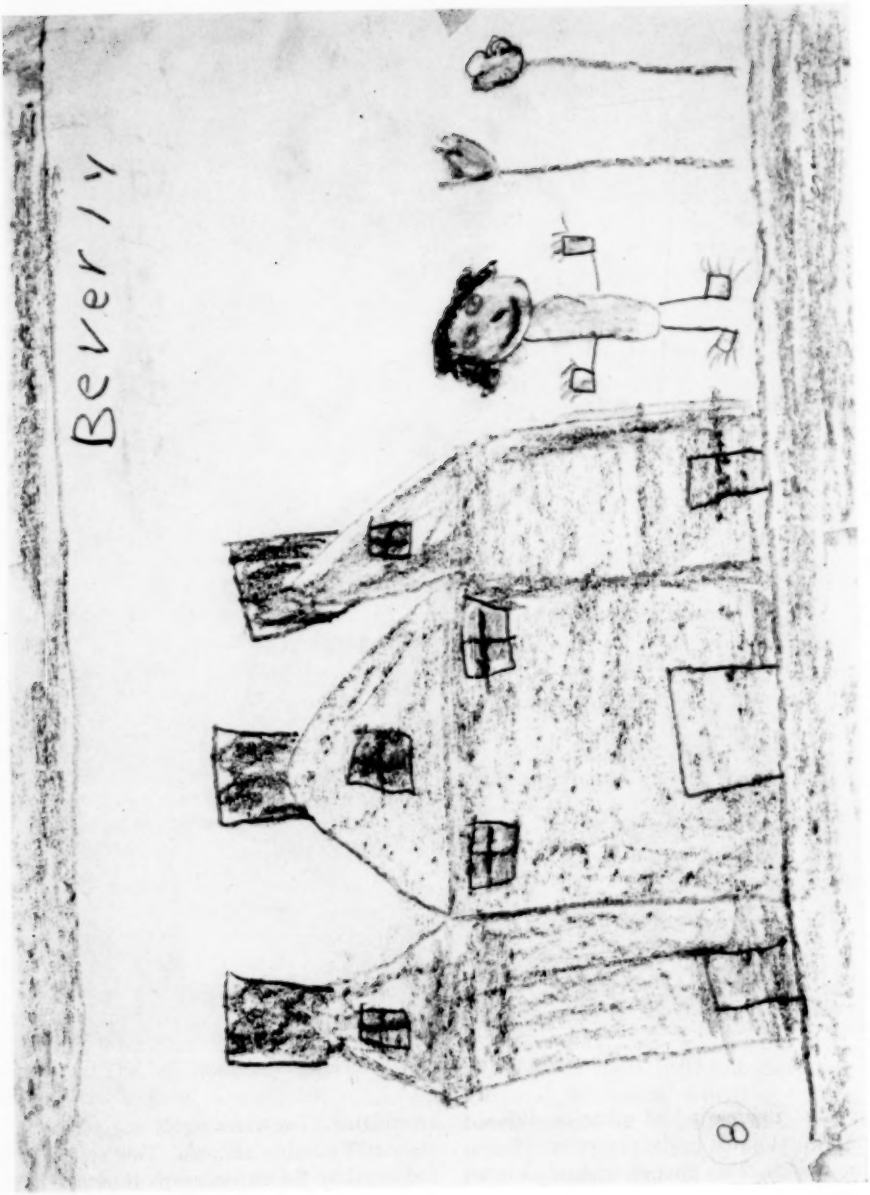


FIG. 8. About 5 months after insulin treatment.

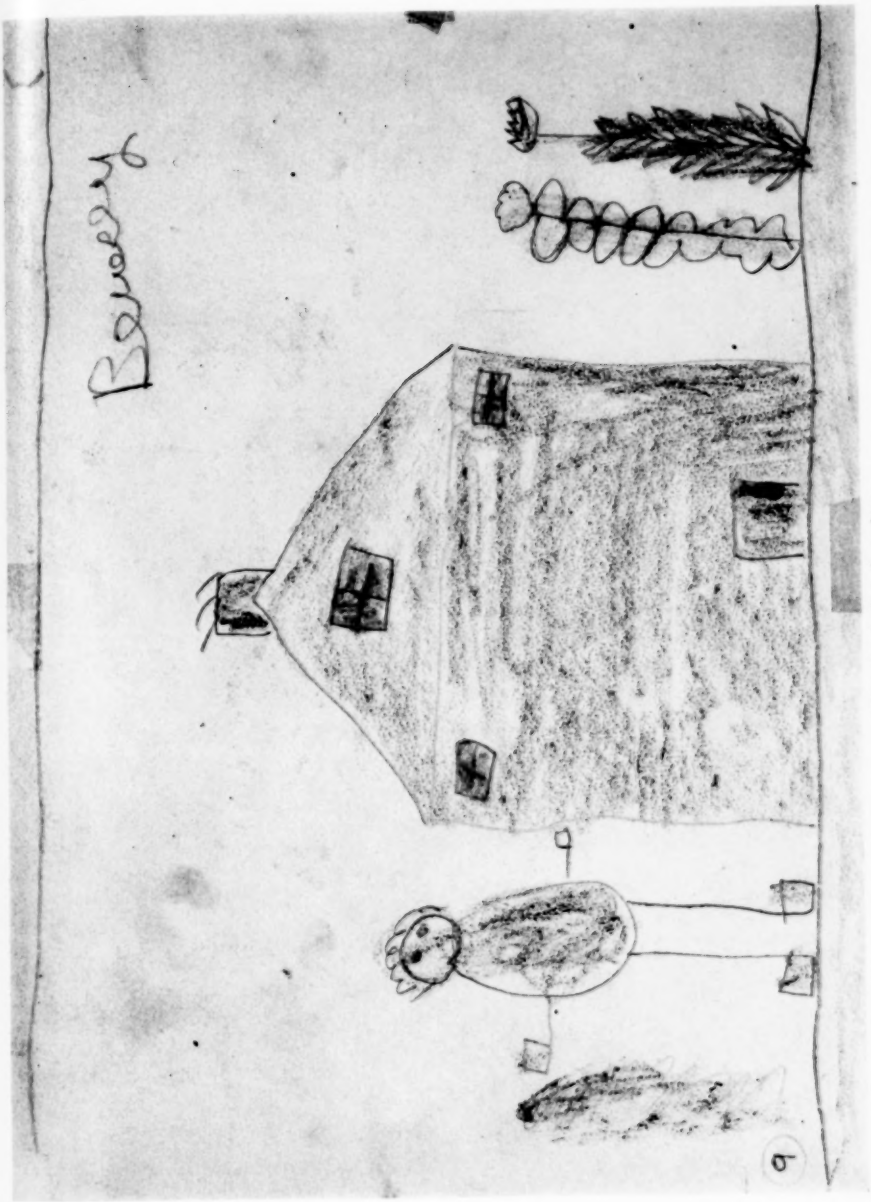


FIG. 9. A few days later

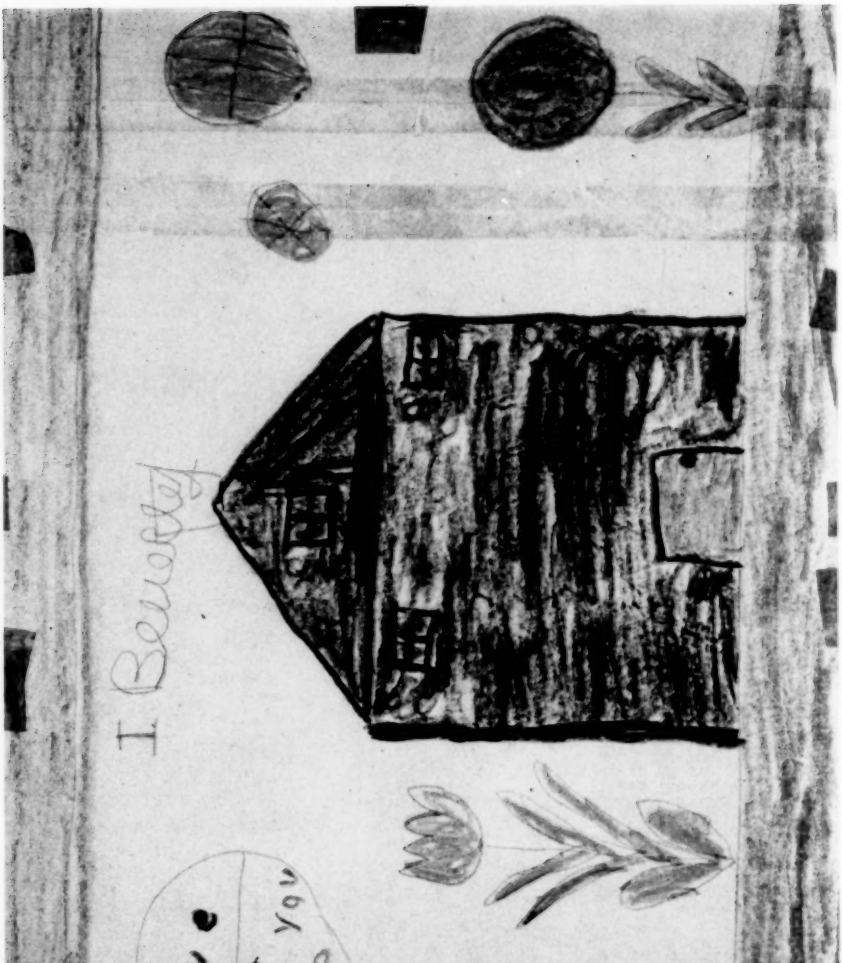


FIG. 10. About 1 year after insulin treatment

therapeutic transference as it is promoted by small doses of insulin.

About 2 months after termination of insulin treatment Beverly produced spontaneously this drawing (figure 7) which she then continued to draw for the next few months. It shows a large house, a door with windows and 2 side towers. It appears like a modified version of the building housing the children's service. The two flowers (parents) seen in drawings prior to insulin treatment are here replaced by the two side towers (representing parental substitutes).

About 5 months after insulin treatment Beverly was told of her parents' request for a home visit during Christmas vacation. This drawing (figure 8) doubtless indicates reactivation of the competition between two conditioned stimuli. Symbolically speaking, Beverly's ego, now already assuming human figure, is torn between the security (resulting from corrective emotional experience) of the children's service and her loyalty to her inadequate parents.

A few days later Beverly expressed her decision in this drawing (figure 9). She apparently adopted the children's service as her home by replacing the large building with a house she used to draw prior to insulin treatment. Also, she appears taller than in the preceding drawing, displaying an ego growth sufficient enough to enable her to break away from an undesirable dependency, as she indicates by moving away from her parents towards the other side of the house.

About 1 year after insulin treatment Beverly produced this drawing (figure 10). The blossom part of the right flower has changed to a pronounced disc form representing the sex symbol of female parental figure. Just above this flower (Beverly's usual place to put ego symbols like previously the cross) there are 2 yellow discs representing Beverly and a girl friend. These discs are suggestive of female identification processes. The generous concession "I love you to" painted above the left flower (suggestive of male sex symbol) may indicate Beverly's reconciled attitude towards the male figure.

SUMMARY

A theory of social learning is outlined linking orthodox Pavlovian with Freudian conceptualizations.

On the basis of this theory correlation of physiological and psychological pathogenesis of behavior disorders is discussed, and the mode of action of insulin in the treatment of these disorders is suggested.

Biological conditioning and psychoanalytical processes, being commonly reflected in drawings of insulin treated children, are demonstrated here in a series of drawings of an insulin treated child.

The author is deeply indebted to Dr. E. R. Clardy, Director of the children's service of Rockland State Hospital, for encouraging this paper with valuable and stimulating advice.

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KORSAKOFF AND WERNICKE SYNDROMES: HISTORY AND TREATMENT[1]

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There is a definite relationship between Korsakoff and Wernicke syndromes, yet no clear-cut pathological kinship can be found by a search of the literature. Only during the last 15 years has the specific etiology of Wernicke's syndrome been more completely clarified; its histopathology is agreed upon. Many pathological changes have been described in Korsakoff's syndrome, yet no concise area seems apparent. Carmichael and Stern gave an excellent review, and the authors quoted described widely diverse changes.

The first description of the clinical picture later crystallized by Korsakoff was apparently by Mangus Huss in 1852 (11). Strumpel in 1883 recorded such a case as did Charcot in 1884 (11). All the above cases were in alcoholics. Korsakoff, in 1887, was the first to summarize the entity after correlating his findings in 6 cases, and it was he who first connected it to other non-alcoholic polyneuritides (21). Korsakoff stated, "This mental disorder expresses itself now in the form of an extremely pronounced irritable weakness of mental functions, now in the form of confusion, with defects relating to time, place and situation being particularly characteristic, and again in almost pure form of acute amnesia in which the memory of the immediate past is intensely affected while the more remote past remains quite clear in the memory. The mental alteration is almost always accompanied to greater or lesser extent by the polyneuritis of alcoholism. It does not, however, belong exclusively to alcoholic neuritis but it may occur also with neuritis of other origin." And although Korsakoff put the polyneuritis in a rather prominent place, he commented that the mental picture may exist without any evidence of such a neuritis.

Wernicke in 1881 published his monumental paper after observation and study of only three cases (29). He stated that he followed the first case through the entire sickness without any clear understanding of its significance. However, he was then able to diagnose the second and third cases in spite of the differences in their general symptoms and to offer them as examples of a specific disease; namely, polioencephalitis hemorrhagica superior. A summary of his description of the cases which were autopsied is as follows: "This is an independent acute inflammatory disease involving the motor nuclei in the neighborhood of the nerves to the eye muscles and leading to death within 10 to 14 days. Focal symptoms consist of paralysis of conjugate movements of the eyes which develops rapidly, continues to progress and finally ends with an almost total paralysis of the eye muscles. And yet there are some muscles which are spared, such as the sphincter iridis and levator palpebrarum. The gait is reeling with a combination of stiffness and ataxia. There is a disturbance of consciousness with somnolence or agitation. Changes in the papillae are characteristic. The first case had gone through a recent acute poisoning with sulfuric acid resulting in pyloric stenosis; the next two had an unusually bad history of alcoholism."

As regards attempts to relate one to the other, Bonhoeffer in 1894 stressed the fact that Wernicke's syndrome was frequently associated with delirium tremens and with Korsakoff's syndrome (3). Gamper in 1928 (16) and Tsiminakis in 1931 (27) both felt that the pathology of Korsakoff and Wernicke syndromes is related. Bender and Schilder (1) in 1933, after analysis of 27 cases, concluded that Wernicke's syndrome is frequently complicated by other types of alcoholic encephalopathy such as delirium tremens, Korsakoff's syndrome and the catatonic syndrome. Kant in 1932 felt that the relationship of the two is constant, finding Wernicke's encephalopathy in all fatal cases of Korsakoff and finding Korsakoff clinically in almost all cases of

[1] Reviewed in the Veterans Administration and published with the approval of the Chief Medical Director. The statements and conclusions published by the author are the result of his own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

Wernicke's syndrome (20). He felt that if a case of Wernicke's does not show Korsakoff symptoms, death occurred before it had time to develop. In 1931 Carmichael and Stern failed to find Wernicke lesions in Korsakoff patients (6). Campbell and Biggart in 1939, after analysis of 12 cases of Wernicke's with autopsy, believed that the weight of evidence in the literature, supported by their own series, is in favor of a frequent if not constant association of the two (5).

It is interesting to note that in their original papers, neither Wernicke nor Korsakoff excluded causes other than alcohol; yet one continues to find those who tend to identify these syndromes as alcoholic entities. Korsakoff included one woman who developed the syndrome after operation for ectopic pregnancy. Ely reported 4 cases of Korsakoff in multiple neuritis following toxemia of pregnancy (14). Cubitt (9), Tarachow (26) and Hall (17) reported cases of Korsakoff syndrome following subarachnoid hemorrhage. Climenko reported a case of Korsakoff following encephalitis lethargica (8). Foerster and Gagel have described the Korsakoff-like features in patients with third ventricle tumors (15). It has also been described in head injury, cerebral lues, diabetes mellitus, tuberculosis, typhoid, puerperal infection, arsenic, lead and carbon monoxide poisoning, and in hypothalamic disorders. Wernicke's is described in postoperative vomiting by Ecker and Woltman (13) and in febrile disease by Chang, Suh and Ling (7).

It is obvious from the above enumeration of varied diseases in which the diseases are seen that a common factor must be present. However, it has only been in recent years that a clearer understanding of the etiology has been worked out. Earlier authors, noting that the pathology of Wernicke's syndrome was confined to that part of the central nervous system bathed by cerebrospinal fluid, concluded that some noxious agent present in the spinal fluid must be responsible. Bender and Schilder in 1933 conceived the possibility of a noxious agent being responsible but suggested that it might be due to a vitamin deficiency or the result of generalized metabolic disease. Jolliffe, Wortis and Fein noted that in 25 of 26 cases of Wernicke's that a peripheral neuropathy either preceded or accompanied the ophthalmoplegia and quoted Alexander who contended that smaller amounts of thiamin are necessary to protect against angiodegeneration that are necessary to preserve the functional integrity of peripheral nerves (19). In 1939 Bowman, Goodhart and Jolliffe studied 51 cases of Korsakoff in considerable detail as regarded treatment and suggested the role of vitamin B-1 in the etiology, but they could not conclude positively because of the wide variety of cases (4). Ecker and Woltman concluded in 1939 that Wernicke's syndrome is due to vitamin B-1 deficiency.

Although it now appears obvious that thiamin deficiency is responsible for Wernicke's syndrome, one must ask why more cases are not seen in other types of thiamin deficiency. Chang, Suh and Ling supplied a very reasonable explanation of this apparent discrepancy. They noted that in their cases of Wernicke's associated with febrile disease the neurologic manifestations are preceded by marked anorexia, and they felt that, generally speaking, in the presence of marked anorexia and impaired gastrointestinal function vitamin intake and absorption are necessarily reduced. The presence of fever thus raises the metabolic rate and calls for increased vitamin supply from already depleted sources, and this reduces the vitamin concentration still further. They conclude that vitamin B-1 deficiency alone is not sufficient; that there must be a complicating factor which increases the vitamin requirement. They support this view clinically by the observation that they have not observed symptoms of Wernicke's in pernicious forms of beriberi in Shanghai. They called beriberi uncomplicated vitamin B-1 deficiency. This belief is further supported by deWardener and Lennox who reported 52 cases of Wernicke's developing in Japanese prisoners of war whose diets were known to be deficient in thiamin, and most of whom developed dysentery (12). Cruickshank made an unusual study of 8 cases in similar prisoners of war who developed vomiting rather than dysentery (10). Since thiamin was scarce, small doses were given, and he noted that there was a dramatic cessation of vomiting and ocular paralyses. Three of the eight cases showed residual mental changes (probably Korsakoff's). Since thiamin was all the treatment available, Cruickshank felt this fact was

strong evidence that deficiency of vitamin B-1 alone is the all-important factor in the production of Wernicke's syndrome.

It would appear, then, that frequently Wernicke's syndrome develops in those whose intake or absorption of thiamin is deficient and in whom some complicating factor increases the requirement, producing a relatively greater deficiency. Vomiting in alcoholics from gastritis may well be a factor, and alcohol raises the basal metabolic rate. Pernicious vomiting of pregnancy, vomiting from pyloric stenosis and post-operative vomiting fall into the category of deficient absorption with further complicating metabolic derangement. Tuberculosis, other febrile diseases, and gastric cancer would seem to conform in like manner. Other etiologic conditions such as carbon monoxide and other poisoning, subarachnoid hemorrhage and third ventricle tumors produce pathological changes directly in the central nervous system.

From material in the literature and from the author's own observations, one could regard the alcoholic psychoses, Wernicke and Korsakoff syndrome clinically as degrees of the same underlying pathological process. If observed carefully and often, cases of delirium tremens frequently show fleeting to more persistent ocular palsies and according to definition could be regarded as Wernicke's syndrome. Cases recovering from the eye signs of Wernicke's are often left with residual Korsakoff's syndrome, such as the cases cited by Cruickshank.

Treatment of Wernicke's syndrome is essentially the same as treatment of alcoholic psychoses. Wallace stresses administration of hypertonic glucose and insulin with at least 100 mg. of thiamin daily (28). Williams recommends as much as 2,000 mg. of thiamin during the first 24 hours and continuation of smaller doses for about a week, together with 5 per cent glucose in saline intravenously daily. He also stressed administration of vitamin C or fresh orange juice (30). Jolliffe noted the importance of thiamin particularly regarding response of ocular symptoms and to some extent response of stupor (18). Jolliffe, Wortis and Fein concluded that the ophthalmoplegia is due to vitamin deficiency and that the remainder of the symptoms result from other factors disturbing cerebral metabolism.

Bender and Schilder (2) and Davidson produced excellent evidence to support the role of underlying emotional conflicts in the production of the total picture of Korsakoff syndrome. Resistance to treatment is common, but Talkington and Cheavens report recovery of a case treated with insulin shock therapy (25).

The author has found the following routine of treatment of acute cases to be useful: Administration of 1,000 cc. 10 per cent glucose in saline with 500 to 1,000 mg. of thiamin intravenously daily for 2 days; 150 mg. thiamin, 500 mg. niacin and 150 mg. ascorbic acid intramuscularly daily in divided doses for a week; 10 to 20 units regular insulin before meals; sodium diphenyl hydantoin 1½ gr. t.i.d. as an anti-convulsant. Prior to the advent of chlorpromazine, paraldehyde was preferred for sedation. Chlorpromazine has certainly been a most valuable addition to the tools of the psychiatrist, and in the management of alcoholic psychoses as well as other toxic deliria it is particularly useful. It has the great advantage of not adding the risk of further drug confusion to an already organically confused patient. In the experience of the author, as much as 50 mg. intramuscularly every hour if necessary in more disturbed patients can be administered without undue fear of complications. Rarely is it necessary to continue the drug parenterally for more than 24 hours. Moyer *et al.* found chlorpromazine completely effective in 23 patients with alcoholic delirium (22). Alcohol is never given. Piker showed that from 75 to 90 per cent of patients develop delirium tremens while drinking (23). Thus administration of alcohol as a therapeutic measure has no basis and is contraindicated. Aureomycin or penicillin prophylactically to prevent respiratory or other complications is worthwhile. From 100 to 150 mg. ACTH intramuscularly in divided doses within the first 36 hours as recommended by Smith in the treatment of delirium tremens appears to hasten recovery (24). It can be withheld except in severe cases.

Summary

1. The literature of Korsakoff and Wernicke syndromes is reviewed.

2. The role of thiamin deficiency in the etiology of Wernicke's syndrome is established.

3. Korsakoff and Wernicke syndromes are by no means limited to alcoholics.

4. Alcoholic psychoses, Wernicke and Korsakoff syndromes appear clinically to be degrees of the same underlying process although emotional conflicts probably play a part in Korsakoff's syndrome.

5. The literature on treatment is reviewed, and the author presents a useful routine to follow.

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THE PHYSIOLOGY OF HEMIPLEGIA AND ATHETOSIS

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Recent work on the augmentor and suppressor systems of the brain-stem may be used to clarify the symptom-complex of hemiplegia. The augmentor system augments the response of the motor-horn cells to stimuli arriving from any other source, whether from the cortex by direct stimulation of the motor area, from the otoliths as in decerebrate rigidity, or from the stretch-reflexes in the muscles as in the human knee-jerk (8, 18, 19, 22). The suppressor system suppresses the response of the motor-horn cells to stimuli from all these sources.

The cerebral headquarters of the augmentor system in the human are still not clearly defined; they lie probably in the motor area, whence extrapyramidal fibers descend by way of the subthalamus and hypothalamus, the neo-striatum, the upper reticulum in the pons, and Deiters' nucleus.

The extension upwards of the augmentor system to the highest cortical level has been demonstrated by the work of Delgado (3), using permanently implanted electrodes into the motor cortex of an otherwise normal cat. "Stimulation of two different regions of the cortex . . . produced instantaneous cessation of the animals' activities. The cats remained frozen in the position they held at the moment of excitation. Normal activity was resumed the moment stimulation ceased. Inhibition of motion was not accompanied by loss of muscular tone. The posture of the animal was held correctly during the arrest reaction, the only effect being the cessation of motor activity. Moreover, it was possible to stop the animals in very odd positions. On one occasion stimulation was delivered while the cat was licking itself spontaneously; the movements were stopped as the animal's tongue was out of its mouth. Licking of the body was resumed as soon as the stimulation ceased" (3, p. 443). Delgado likens the effect to the stopping of a motion-picture. He is careful to reject the word 'suppression' as a name for this activity of the cortex, preferring the physiologically non-committal term 'arrest reaction'. His definition of the arrest reaction emphasizes the maintenance of postural tonus during the time of excitation (3, p. 445).

The suppressor system comes in the first place from certain narrow motor suppressor strips on the cortex that were identified after the Brodmann and Economo maps were completed. They have been named according to the areas to which they are adjacent. They are Areas 4S (the principal, between Areas 4 and 6), 8S, 2S and 19S. Descending pathways from all these areas converge upon, or come under the control of Area 24, then pass through either the internal capsule or the palæostriatum, to the lower reticulum in the medulla (2, 10, 11 12).

The lower reticulum in the medulla (bulb) is the last relay for suppressor influences before they descend to the actual executive levels in the cord. "When a background of some motor activity is initiated in an anesthetized or decerebrate animal, and stimulation is applied to the bulbar part of the reticular formation, movement is brought completely to a halt. This suppressor influence is catholic in its action, being effective upon the two-neuron stretch or tendon reflex, upon multineuronal flexor reflexes and upon cortical motor responses. This inhibitory effect is best elicited by stimulating . . . the reticular formation at bulbar levels of the brain stem. Its threshold is exceedingly low and it is easily evoked with brief shocks, suggesting that large, rapidly conducting neural elements are responsible" (11).

The bulbar reticulum probably cannot bring about this suppressor activity on its own initiative. If an external source of neural energy is not forthcoming in the form of an electric shock, a natural equivalent to this artificial stimulus must be supplied from some powerful and instantly available source of inhibitory dynamic which is as yet unidentified.

Three reticular formations in the brain-stem must accordingly be distinguished, all in continuity as the internuclear packing and

inseparable on anatomical criteria—for they have no boundaries, indeed they widely overlap each others' territories. The three sections of brain-stem are mid-brain, pons, and medulla; the three reticular formations are the para-rubral, the upper and the lower reticula. These give rise (directly or indirectly) to descending pathways which traverse the spinal cord as the rubro-spinal, the upper reticulo-spinal and the lower reticulo-spinal tracts. The suppressor response travels along the first and third pathway; the augmentor response, along the second (the upper reticulo-spinal tract) and the vestibulo-spinal tract from Deiters' vestibular nucleus. In the higher animals, and especially in man, the rubro-spinal and the vestibulo-spinal tracts play only minor roles compared with the two reticulo-spinal pathways which are the main executants of extrapyramidal control. For the postural element of that control, however, especially in carnivores (cats and dogs), the vestibulo-spinal tract appears to be more important than the upper reticulo-spinal tract (1).

This triple balance of plus and minus (extra-pyramidal, reticular) setting the stage for voluntary control (pyramidal) explains the sequence and pattern of the symptoms of hemiplegia. The lesion of hemiplegia is an interruption of the pyramidal pathway descending through the bottle-neck of the internal capsule, where it mingles freely with the extrapyramidal suppressor fibers from Area 4S, but not with the augmentor fibers from Areas 4 and 6.

The symptoms of hemiplegia thus present a complicated mixture of effects due to interruption of one or more of the three systems concerned. Blockage of the pyramidal tract (upper motor neurons) leaves a paralysis of voluntary movement in the opposite half of the body; unlike the destruction of the anterior-horn cells of the cord (lower motor neurons), the upper-motor-neuron paralysis leaves muscles which are hypertonic, rigid, spastic. This spasticity of hemiplegia is due to blockage of the suppressor fibers of the extrapyramidal system, probably as they pass through the bottle-neck with the pyramidal tract. Their normal function is to balance with the augmentor system which tends to increase tonus, and when this check is removed, the augmentor system reigns unopposed.

One of the most distressing, at the same time interesting features of hemiplegia, fortunately rare, is the appearance of that slow-motion variety of chorea known as athetosis. The hand performs slow continuous and purposeless contortions or writhings. In view of the essential similarity of chorea and athetosis, it is pertinent to adduce the instance of Huntington's disease (hereditary chorea of adults), which may throw light on hemiplegic athetosis (4). Apart from a general withering of the forebrain (in advanced cases) the characteristic lesion is a localized degeneration of the nerve-cells in the middle zone of the putamen or outer member of the lenticular couple lying against the external capsule. It is possible, therefore, that the athetosis which develops in old-standing hemiplegics may sometimes be due to atrophy of the cells in the putamen, either from pressure of the blood-clot in the external capsule or by cutting-off of the blood-supply from the lenticulo-striate artery.

Confirming this view is the occurrence of athetosis in about four per cent of cases of congenital palsy and birth-injury (spastic paraplegia of infancy, Little's disease). A defect of the neo-striatum is usually present, such that the brain-section has a marbled appearance (*état marbré*, status marmoratus); similar lesions have been discovered in the brains of still-born babies who, of course, have never exhibited the athetosis from which it is presumed they would have suffered. Ford (5, 6) has pointed out that "extensive lesions in the cerebral hemisphere during the period of active growth of the brain are almost invariably associated with deficient development of the opposite cerebellar hemisphere, the pons, and the homolateral lenticular nucleus." Ford suggests that "the defect of the lenticular nucleus in such cases may possibly be significant in view of the frequency of athetosis in cases of congenital hemiplegia." The athetosis of hemiplegia might conceivably be due not to transmitted pressure, but to secondary degeneration of the putamen on the lines suggested by Herrick and Ford.

There is evidence, then, that in both congenital (infantile) and inherited (Huntington's) forms of choreo-athetosis, there is an organic defect of the lenticular nucleus, and especially of the putamen. This cannot be

the whole explanation, however, for the putamen is the principal (but by no means the only) target of attack in progressive lenticular degeneration (Kinnier Wilson's disease), in which athetosis is not usually a prominent symptom; rather is there rigidity of the Parkinsonian type. Damage to the putamen alone, therefore, will not cause athetosis. When, on the other hand, putaminal damage is associated with derangement of cortical and/or pyramidal control, then athetosis may supervene.

There is good evidence for the existence of nervous connexions which descend from Area 6 along extrapyramidal pathways, subserving both suppressor and augmentor (facilitatory) impulses. After section of the pyramidal tracts, strong stimulation of Area 6 causes various movements which must of necessity travel down the relays of the extrapyramidal system. These movements are usually slow, complex and massive, stereotyped synergies or pseudo-purposive actions "related perhaps to postural adjustments and the more instinctive activities of locomotion and defense" (20). The pre-motor face-area (at the lower end of Area 6) yields on stimulation rhythmic motion of the mouth and larynx, as in biting and swallowing (17). "There is a direct pathway from area 6 to the facilitatory portion of the bulboreticular formation of the brain stem, part at least of which gives rise to direct reticulo-spinal fibers. . . . It is clear that there exists an important pathway from Area 6 to the spinal cord by way of the cortico-reticular and the reticulo-spinal fibers. Thus Area 6 can act independently of, as well as in association with, Area 4 in the cortical control of posture and motion" (15). On the other side of the extrapyramidal balance, neural connexions have been traced in the human from Area 6 down to the subthalamus, globus pallidus, substantia nigra and red nucleus (13), all of which have some degree of suppressor function.

That the descending path of athetotic movements passes through the internal capsule is suggested by the fact that "if one who has athetosis develops a hemiplegia, the involuntary movements will disappear from the paralyzed extremities. Furthermore, if athetosis ultimately develops as the result of a lesion which also produces a hemiplegia (as is frequently the case, particularly in children) the involuntary movements will not appear until the paralysis has gone, or has materially subsided" (2).

Unfortunately no less than three explanations can account for this. The simplest is that athetosis descends through the pyramidal tract, some of whose fibers come from Area 6 or are under the influence of Area 6, and that the degree of athetosis rises and falls with the degree of pyramidal disfunction; this is the theory most popular with clinicians. It has been stated, however, that athetosis can be cured by cutting certain extrapyramidal tracts in the spinal cord, completely sparing the pyramidal tract (16); athetosis therefore must pass through the bottle-neck of the internal capsule along extrapyramidal rather than pyramidal fibers. This is the explanation accepted by neurophysiologists.

Pathologists, however, can point to the lesions in the putamen which regularly accompany certain classes of athetosis and chorea, and can suggest that interruption here (either by transmitted pressure, cutting-off of blood-supply, or secondary degeneration) will account for the presence of athetosis in hemiplegic or capsular paralysis.

A major difficulty in the pathology of all these extrapyramidal syndromes is the diversity of the lesions which give rise to seemingly identical clinical symptoms. The putamen has been mentioned in this greatly simplified presentation; a case of athetosis, however, has been described in which the lesions were sharply localized to the globus pallidus, sparing the putamen (14); and one-sided chorea (hemiballismus) is due to hemorrhage into the subthalamus (nucleus of Luys).

No theoretical speculation can yet give a fully satisfactory account of the genesis and transmission of the movements of chorea and athetosis. A useful concept, however, is the contrast between the two types of pathological posture which may be grouped under the headings perpetual motion and perpetual rigidity. At the spinal level, the perpetual motion of the mark-time reflex contrasts with the perpetual rigidity of the decerebrate preparation. In human disease, chorea is perpetual motion and Parkinsonism is perpetual rigidity. At the psychiatric or cortical level, the polar phases of cyclothymia bear

the same relation: severe depression evinces perpetual rigidity and severe mania perpetual motion.

The basic patterns of the perpetual-motion reflexes (swimming, walking, scratching) are intrinsically present in the spinal cord of fishes or carnivorous mammals. They are not cortical movements, and they cannot be evoked by experimental or epileptic stimulation of the cortex.

The subcortical origin of walking has been conclusively demonstrated, as regards the cat, by the experiments of Ward (23). Stimulation of Area 24 in a fully conscious animal clearly differentiated between the subcortical movements of walking (which were suppressed) and the cortical response to a mouse (which was unaffected). Removal of the motor cortex leaves normal physiological walking unaltered; moreover, it leaves the suppression of walking unaltered, not even the threshold of stimulus at Area 24 being raised.

In the healthy human these perpetual-motion reflexes are released, as occasion demands, under the influence of Areas 4 and 6. In disease, this release occurs when the suppressor pathway is partially blocked, and then their fine structure is degraded to the level of athetosis; when, however, the suppressor pathway is wholly blocked, perpetual motion is replaced by perpetual rigidity, that is the spasticity of hemiplegia. This finely balanced quantitative dependence upon the degree of suppressor tonus manifests itself only in the presence of a pre-existent or co-existent damage to the augmentor side of the extrapyramidal couple.

The postulated partial or complete blockage of the suppressor pathway occurs at the site of its intermingling with the pyramidal tracts as they traverse together the bottle-neck of the internal capsule. This accounts for the correlation between the degree of athetosis (extrapyramidal) and voluntary (pyramidal) movement: complete blockage of the pyramidal fibers (causing motor paralysis) is accompanied by complete blockage of the suppressor fibers (releasing spasticity); partial blockage permits some voluntary movement and releases athetosis.

Athetosis, however, can appear in place of spasticity only if the augmentor system is also damaged. This damage can take place in various basal ganglia (caudate nucleus, putamen) or in the cerebellum. All of these sites are known to be concerned with the augmentor side of the extrapyramidal balance, and each of them has been found to be diseased in one or other of the classical post-mortem studies of choreo-athetosis.

The difference in the pathology of ordinary chorea, slow-motion chorea (athetosis), and unilateral chorea (hemiballismus) is probably dependent upon changes in the relative balance of suppressor and augmentor circuits. Athetosis and Huntington's chorea are due to a partial block of the suppressor system, combined with a partial block of the augmentor system. Chorea proper is due to a selective block of the augmentor system, leaving a normal or nearly normal suppressor system. Hemiballismus is due to a severe lesion (usually a hemorrhage) into one subthalamus, which is presumably a bottle-neck in the augmentor system, with the infliction of equal damage upon the intermingled suppressor cells.

That suppressor cells are in fact present in the subthalamus (in cats) is indicated by the results of subthalamic stimulation, which (by suppressing rigidity) releases the inborn walking-patterns of the spinal cord. "The promptness, smoothness and regularity of the locomotor movements produced by subthalamic stimulation are evidence in themselves that the subthalamus contains a specific mechanism which governs the alternation of the legs in walking. . . . The locomotor point appears to be in Forel's field at the level of the subthalamic decussation, dorsal to the mammillary body and near the subthalamic nucleus of Luys. . . . The strongest responses to subthalamic stimulation were homolateral" (21). Previous workers had found that cats in which this region had been separated from the lower parts of the brain-stem by transverse section were unable to walk (7), suggesting the coming into operation of an unbalanced augmentor bias, released from subthalamic suppression. These experiments are further proof of the wholly subcortical origin of the movements of walking.

It may be inferred from this clinical and experimental material that the perpetual-motion reflexes of the cord are released from pyramidal (voluntary) and extrapyramidal

(augmentor and suppressor) influence only when the augmentor deficit is greater than the suppressor deficit. If the reverse should occur, the result is rigidity. Pyramidal activity alone is powerless to effect a discharge along the anterior-horn cells; it serves merely to sensitize the posterior-horn cells to incoming afferents (9).

Rigidity occurs when the suppressor deficit is greater than the augmentor deficit, as in the case of suppressor damage in the bottleneck in hemiplegia. The suppressor system, however, has an alternative pathway from the cortex; not all of its fibers pass with the pyramidal tract through the internal capsule: some go direct to the palæo-striatum, that is the globus pallidus and substantia nigra. Damage to the suppressor pathway in transit through either of these nuclei might be expected to cause symptoms that were similar to, but not identical with, those caused by damage to the suppressor pathway through the internal capsule. This indeed is found to be the case, and palæo-striatal lesions are well recognized as the basic pathology of Parkinson's rigidity. This has much in common with hemiplegic rigidity, on account of their common origin in blockage of the suppressor circuits; on the other hand, there are certain notable differences, which may reasonably be attributed to the fact that hemiplegic rigidity is due to a lesion in the internal capsule, Parkinson's rigidity to a lesion in the basal ganglia. In both diseases the rigidity is maintained by the augmentor system which, it must be assumed, still retains at least some of its power.

Summary

The spasticity and athetosis of hemiplegia are discussed in relation to the augmentor and suppressor pathways of the extrapyramidal system. Spasticity is due to suppressor deficit leaving an unbalanced augmentor influence. Athetosis is due to a net augmentor deficit allowing the release of degraded subcortical movements. A new concept is introduced of the polarity of perpetual motion and perpetual rigidity at the three levels: spinal, basal, cortical. At the lowest level are the mark-time reflex and decerebrate rigidity; at the middle level, chorea and athetosis, rigidity and spasticity; at the highest level, the perpetual motion of mania, the perpetual rigidity of melancholia. It is believed that the same pattern of neural mechanisms may be discerned at all three levels.

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MARITAL STATUS AND MENTAL DISEASE AMONG NEGROES IN NEW YORK STATE

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It is known that rates of mental disease, as measured by rates of first admissions to mental hospitals, vary according to marital status (1). In general, rates of mental disease are higher for the unmarried (single) than for the married. To this, there were two important exceptions (2). Married women had higher rates of general paresis than single females. They also had higher rates of alcoholic psychoses. The highest rates occurred among the divorced population.

These variations are usually explained as the results of two sets of factors. The first is the element of personality. Marriage is a selective factor and therefore includes, on the average, a higher percentage of those who are healthy, both physically and temperamentally. This process of selection leaves the unmarried with a large proportion of those who are predisposed, because of personal characteristics, to abnormalities of various types. This is especially noticeable in connection with dementia praecox, where the marriage rate is far below the average. The second factor influencing the rate of mental disease is the environment created by marriage itself. Especially when there are children, the family is a stabilizing influence.

The combination of the two sets of factors is seen among the divorced. It is recognized that the divorced include a high percentage of unstable personalities. In addition, however, there are the social factors culminating in the process of divorce. The loss of the stabilizing influence of marriage is an important factor in the rate of mental disease among the widowed.

There were 571,221 Negroes in New York State on April 1, 1940. It is proposed in the following study to analyze rates of first admissions among these Negroes in relation to marital status. The latter data are given in a special report issued by the Bureau of the Census (3). Unfortunately, these data are not adapted to our purposes in two respects. In the first place, the important social characteristic of separated marital status is not shown. Again, the grouping with respect to age includes too few classes. Therefore, we shall use the total non-white population of New York State on April 1, 1940, as the basis for our analysis since the data for the latter are complete with respect to the two preceding factors (4). Negroes constituted 95 per cent of the total non-white population. It is evident, therefore, that no significant error will be introduced by substituting the general non-white population of New York State for the Negro population.

If one divides the population of New York State in 1940 into two categories, the single and those who belonged to one or other of the remaining marital groups, then there was little difference between the non-whites (primarily Negroes) and the white population. Thus, of the non-whites aged 15 years or over on April 1, 1940, 32.4 per cent were single and 67.6 per cent were either married, widowed, divorced or separated. The corresponding percentages for the white population were 32.3 and 67.7, respectively. However, the differences within the marital groups were markedly different. Thus, only 42.4 per cent of the non-whites were married, compared with 55.7 per cent of the whites; and 15.1 per cent of the non-whites were either separated or divorced, compared with only 4.2 per cent of the whites. There was also a difference with respect to widowhood, 10.1 per cent of the non-whites being in this category, compared with only 7.9 per cent of the whites (4).

As the non-whites (primarily Negroes) showed such substantial differences in marital status, compared with the whites, it is desirable to see whether these differences are also reflected in the distribution of mental disease. Therefore, the statistics of marital status among Negro first admissions to mental hospitals in New York State will be reviewed. The data consist of Negro first admissions, aged 15 years or over, to all hospitals for mental disease in New York State during the three fiscal years which ended June 30, 1941. There were 3,862 such first admissions, of whom 1,249, or

32.3 per cent, were single; 1,247, or 32.3 per cent, married; 691, or 17.9 per cent, widowed; and 675, or 17.4 per cent, separated or divorced.

Single

The 1,249 first admissions, aged 15 years or over, represented an average annual rate of 273.3 per 100,000 unmarried population. Of this total, 562, or 45.0 per cent, were diagnosed as dementia praecox, corresponding to an average annual rate of 123.0 per 100,000 population. Of the major groups of psychoses, general paresis included 124, or 9.9 per cent of the total, and the alcoholic psychoses included 116, or 9.3 per cent. These corresponded to average annual rates of 27.1 and 25.4, respectively. Psychoses with cerebral arteriosclerosis followed with 81 cases, or 6.4 per cent of the total, an average annual rate of 17.7.

Males and females had average annual rates of 327.4 and 215.1, respectively, per 100,000 corresponding population aged 15 years or over. The highest rates were for dementia praecox, males and females having rates of 133.3 and 111.8, respectively. The greatest disparities occurred in connection with general paresis and the alcoholic psychoses. Rates for general paresis were 40.5 and 12.7 for males and females, respectively. In the alcoholic psychoses, males and females had rates of 41.4 and 8.2, respectively.

Married

The 1,247 Negro married first admissions represented an average annual rate of 208.6

TABLE 1.—Negro First Admissions* to All Hospitals for Mental Disease in New York State, 1939–1941, of Single Marital Status, Classified according to Mental Disorders

Mental Disorders	Number			Per Cent			Average Annual Rate per 100,000 Single Negro Population*		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
General paresis	96	28	124	12.4	5.9	9.9	40.5	12.7	27.1
Alcoholic	98	18	116	12.6	3.8	9.3	41.4	8.2	25.4
With cerebral arteriosclerosis	45	36	81	5.8	7.6	6.4	19.0	16.4	17.7
Senile	6	17	23	0.8	3.6	1.8	2.5	7.7	5.0
Involutional	1	6	7	0.1	1.3	0.6	0.4	2.7	1.5
Manic-depressive	22	33	55	2.8	7.0	4.4	9.3	15.0	12.0
Dementia praecox	316	246	562	40.7	52.0	45.0	133.3	111.8	123.0
Other	192	89	281	24.7	18.8	22.5	81.0	40.4	61.5
Total	776	473	1,249	100.0	100.0	100.0	327.4	215.1	273.3

* Aged 15 years or over.

TABLE 2.—Negro First Admissions* to All Hospitals for Mental Disease in New York State, 1939–1941, of Married Status, Classified According to Mental Disorders

Mental Disorders	Number			Per Cent			Average Annual Rate per 100,000 Married Negro Population*		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
General Paresis	226	53	279	30.4	10.5	22.4	75.3	17.8	46.7
Alcoholic	115	36	151	15.5	7.1	12.1	38.3	12.1	25.3
With cerebral arteriosclerosis	103	79	182	13.9	15.6	14.6	34.3	26.5	30.4
Senile	31	11	42	4.2	2.2	3.4	10.3	3.7	7.0
Involutional	4	19	23	0.5	3.8	1.8	1.3	6.4	3.8
Manic-depressive	11	30	41	1.4	5.9	3.3	3.7	10.1	6.9
Dementia praecox	131	185	316	17.7	36.6	25.3	43.7	62.1	52.9
Other	121	92	213	16.3	18.2	17.1	40.3	30.0	35.6
Total	742	505	1,247	100.0	100.0	100.0	247.4	169.6	208.6

* Aged 15 years or over.

TABLE 3.—NEGRO FIRST ADMISSIONS* TO ALL HOSPITALS FOR MENTAL DISEASE IN NEW YORK STATE, 1939-1941, OF WIDOWED STATUS, CLASSIFIED ACCORDING TO MENTAL DISORDERS

Mental Disorders	Number			Per Cent			Average Annual Rate per 100,000 Widowed Negro Population*		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
General paresis	33	38	71	13.4	8.6	10.3	113.8	33.6	50.0
Alcoholic	37	21	58	15.0	4.7	8.4	127.6	18.6	40.8
With cerebral arteriosclerosis	89	183	272	36.0	41.2	39.4	306.9	161.9	191.5
Senile	35	80	115	14.2	18.0	16.6	120.7	70.8	81.0
Involutional	2	12	14	0.8	2.7	2.0	6.9	10.6	9.9
Manic-depressive	2	8	10	0.8	1.8	1.4	6.9	7.1	7.0
Dementia praecox	6	44	50	2.4	9.9	7.2	20.7	38.9	35.2
Other	43	58	101	17.4	13.1	14.6	148.3	51.3	71.1
Total	247	444	691	100.0	100.0	100.0	851.8	392.8	486.6

* Aged 15 years or over.

per 100,000 married population, compared with 273.3 for the single population. Of these 1,247 first admissions, 316, or 25.3 per cent, belonged to the group of dementia praecox. General paresis, the next largest group, included 279 cases, or 22.4 per cent of the total. These were followed by psychoses with cerebral arteriosclerosis and alcoholic psychoses, which included 182 and 151 cases, respectively, or 14.6 and 12.1 per cent, of the total. These were in marked contrast to the unmarried first admissions. The latter had an excess of dementia praecox, compared with the married. On the other hand, general paresis and psychoses with cerebral arteriosclerosis were more marked among the married. These differences were related, in large part, to the relative age distributions of the single and the married.

There were several marked differences with respect to sex. General paresis and the alcoholic psychoses were more prevalent among males. The average annual rates of first admissions with psychoses with cerebral arteriosclerosis and senile psychoses were also higher among males. On the other hand, the rates for the functional groups, including dementia praecox, were higher for the females.

WIDOWED

There were 691 widowed first admissions. They belonged to an older age group than the married. In consequence, the leading groups of mental disorders were those associated with advanced age. Psychoses with cerebral arteriosclerosis included 272 cases, or 39.4 per cent of the total, with an average annual rate of 191.5 per 100,000 widowed population. The senile psychoses included 115 cases, or 16.6 per cent of the total. The average annual rate was 81.0. Dementia praecox, on the contrary, included only 50 cases, or 7.2 per cent of the total, with an average annual rate of 35.2.

Except for dementia praecox, widowers had generally higher rates of first admissions than Negro males who were single or married. This may possibly be explained as a combination of personal and social characteristics. Many widowers remarry and thus are included with the statistics of the married group. This leaves the widowed group with a selected remainder who, on the average, probably possessed personal traits which not only barred them from remarriage but made widowhood a painful experience. The picture was similar for widows. Though their rates for psychoses of organic origin were higher than those for the married and single, the rates for dementia praecox and manic-depressive psychoses were lower.

SEPARATED AND DIVORCED

There were 675 first admissions who were either separated or divorced, giving an average annual rate of 316.5 per 100,000 corresponding general population. Only the widowed had a higher rate. The largest group was dementia praecox, which included 30.7 per cent of the total first admissions, with an average annual rate of 97.1. This was less than the corresponding rate for the single, but in the other ma-

TABLE 4.—NEGRO FIRST ADMISSIONS* TO ALL HOSPITALS FOR MENTAL DISEASE IN NEW YORK STATE, 1939–1941, OF SEPARATED OR DIVORCED STATUS, CLASSIFIED ACCORDING TO MENTAL DISORDERS

Mental Disorders	Number			Per Cent			Average Annual Rate per 100,000 Sep. or Div. Negro Population*		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
General paresis	68	31	99	20.4	9.1	14.7	76.8	24.9	46.4
Alcoholic	81	35	116	24.3	10.2	17.2	91.4	28.1	54.4
With cerebral arteriosclerosis	41	34	75	12.3	9.9	11.1	46.3	27.3	35.2
Senile	3	5	8	0.9	1.4	1.2	3.4	4.0	3.8
Involutional	2	16	18	0.6	4.7	2.7	2.3	12.8	8.4
Manic-depressive	5	16	21	1.5	4.7	3.1	5.6	12.8	9.8
Dementia praecox	68	139	207	20.4	40.6	30.7	76.8	111.4	97.1
Other	65	66	131	19.5	19.3	19.4	73.4	52.9	61.4
Total	333	342	675	100.0	100.0	100.0	376.1	274.2	316.5

* Aged 15 years or over.

jor categories the rates for the separated and divorced were in excess of those for the single.

The sex differences were marked, males being in excess with respect to general paresis, alcoholic psychoses, and psychoses with cerebral arteriosclerosis. The female rates were higher in the functional groups of mental disorders.

Certain demographic factors must be considered in comparing the rates of mental disease among the several marital groups. The sex ratio is of significance since, in general, rates of mental disease are higher for males than for females. In this respect, the unmarried (single) were at a disadvantage since their ratio was 107.8 males to 100 females. Males were in only a slight excess among the married, the ratio being 100.7 to 100. Females were in great excess among the widowed, however, there being only 25.7 males to 100 females in this category. There was a similar deficiency of males who were separated or divorced, there being only 71.0 males to 100 females (4). There is some question, however, as to the accuracy of the classifications, especially among males. There is reason to believe that many who were reported as single were probably separated. On the other hand, it is also probable that many who were reported as separated or divorced belonged more properly to the category of single (never married).

The relative rates of first admissions are also affected by the age distribution, the older groups having higher rates. The married group was, of course, older than the single, the median ages being 37.4 and 25.1 years, respectively. A fourth of the unmarried were under 20 years of age, whereas the corresponding age for the married was 30. The age distributions of the married, the separated and divorced among the general Negro population, aged 15 or over, were almost identical. The widowed differed significantly, however. The median age of the widowed was 51.4 years, compared with 37.4 for the married, and 37.7 for the separated and divorced (4).

Such large differences in the sex ratios and in the age distribution require adjustments that make the marital groups comparable in these respects. Therefore the rates were standardized in the following manner.

The sex ratio was taken as that existing in the general population of New York State, aged 15 years or over, on April 1, 1940. With respect to age, the standard was the population of New York State on the same date, in intervals of 5 years. The lower limit was age 15 for all first admissions as a group, general paresis, manic-depressive psychoses, and dementia praecox. The lower limit was 20 years for the alcoholic psychoses and 45 years for psychoses with cerebral arteriosclerosis and senile psychoses.

ALL PSYCHOSES

The standardized rate of first admissions (all mental disorders) was 370.3 for the single and 270.0 for the married groups. Each sex showed a higher rate for the single than for

TABLE 5.—AVERAGE ANNUAL STANDARDIZED RATES* OF FIRST ADMISSIONS TO ALL HOSPITALS FOR MENTAL DISEASE IN NEW YORK STATE, 1939–1941, PER 100,000 NEGRO POPULATION, CLASSIFIED ACCORDING TO MARITAL STATUS

Marital Status	Males	Females	Total
Single	391.4 ± 15.0	340.3 ± 14.5	370.3 ± 10.5
Married	290.1 ± 11.4	240.8 ± 10.5	270.0 ± 7.8
Widowed	593.4 ± 52.7	252.8 ± 17.4	423.4 ± 20.1
Separated or divorced	368.3 ± 23.8	317.2 ± 18.6	345.6 ± 14.8

* Population of New York State aged 15 years or over on April 1, 1940 (in intervals of 5 years) taken as standard.

the married. There are interesting variations, however. Thus, the rates for the single males exceeded those for the married males up to age 50. At subsequent ages the married males had higher rates. Beginning with age 25, there was a decreasing trend in the ratio of the rates of the single to those of the married. This is contrary to what might have been expected. The younger age groups include many who will marry at later ages. It may be assumed that they represent smaller percentages with increasing age of the group. If marriage selects the sounder part of the population, then the disparity between single and married should increase with advancing age, whereas the contrary was the case. Marriage exercised a favorable influence with respect to mental disorders at the younger ages among males, but disruptive forces appeared in later years. Females differed in this respect, however, for the rates of the single exceeded those of the married at all ages. In general, the relative excess of the single was greated at the younger years, as in the case of the males. Such trends weaken the hypothesis that innate personal characteristics are the predominant factor in causing mental disease.

Single females had a higher standardized rate than either of the remaining marital groups. The rate for the widowed group did not differ significantly from that for the married. Among males, however, the highest rate occurred among widowers. Widowhood undoubtedly creates difficult and depressive circumstances, which react upon mental health. But this is clearly more significant for males than for females. The latter, especially when there are children, apparently continue the usual routine of their lives. It is probable that there is a selective factor among males, acting through remarriage, which leaves the remaining widowers with a lesser capacity for adaptation to their state of widowhood.

General Paresis

The standardized rate of first admissions with general paresis was highest among widows. There were no significant differences among the other marital groups.

The rate was highest among widowers. The remaining male marital groups showed no significant differences. All rates, however, were in excess of the corresponding rates among females. Among the latter, the rates varied within narrow limits from 24.9 for widows and 24.6 for the separated and divorced to 20.0 for the married and 21.5 for the single.

With the exception of widowers, the marital groups showed so little difference in the prevalence of general paresis that this should be interpreted as evidence of the spread of syphilis on a wide scale. The very small difference between the single and the married is an important social fact which must be considered in the light of sex practices in general.

Alcoholic Psychoses

The alcoholic psychoses varied widely in their prevalence. They were highest among the widowed, followed by the separated and divorced. They were least prevalent among the married.

Males had much higher rates of alcoholic psychoses than females. Among the former, the rates varied from a maximum of 162.2 among widowers to a minimum of 35.9 among the married. The rate for the separated and divorced was the second highest. For females, the lowest rate, 8.6, occurred among the single. The highest rate, 21.2, occurred among the separated and divorced, but this did not differ significantly from the rate for widows.

TABLE 6.—AVERAGE ANNUAL RATES OF FIRST ADMISSIONS AMONG NEGROES TO ALL HOSPITALS FOR MENTAL DISEASE IN NEW YORK STATE, 1939–1941, CLASSIFIED ACCORDING TO SEX, AGE, AND MARITAL STATUS

Age (years)	Males			Females		
	Single (a)	Married (b)	$\left(\frac{a}{b}\right)$	Single (a)	Married (b)	$\left(\frac{a}{b}\right)$
15–19	164.4	274.3	0.60	140.8	122.0	1.15
20–24	335.1	133.8	2.50	169.6	103.0	1.64
25–29	407.8	139.6	2.92	238.8	139.6	1.71
30–34	436.2	198.7	2.20	271.6	155.4	1.74
35–39	360.5	194.4	1.85	283.8	155.6	1.82
40–44	326.1	205.8	1.58	197.1	147.9	1.33
45–49	457.7	292.8	1.56	313.6	215.3	1.46
50–54	448.3	345.0	1.30	222.7	211.0	1.06
55–59	329.8	339.9	0.97	419.0	280.3	1.49
60–64	426.9	451.8	0.94	548.2	277.9	1.97
65–69	765.6	686.2	1.12	851.1	700.6	1.21
70–74	392.2	660.4	0.59	1,159.4	493.1	2.35
75 or over	920.8	1,391.5	0.66	1,932.4	216.2	8.94

TABLE 7.—AVERAGE ANNUAL STANDARDIZED RATES* OF FIRST ADMISSIONS WITH GENERAL PARESIS TO ALL HOSPITALS FOR MENTAL DISEASE IN NEW YORK STATE, 1939–1941, PER 100,000 NEGRO POPULATION, CLASSIFIED ACCORDING TO MARITAL STATUS

Marital Status	Males	Females	Total
Single	62.9 ± 6.0	21.5 ± 3.6	41.8 ± 3.5
Married	65.5 ± 5.4	20.0 ± 3.0	42.2 ± 3.1
Widowed	112.6 ± 23.0	24.9 ± 5.4	68.1 ± 8.1
Separated or divorced	62.0 ± 9.8	24.6 ± 5.2	42.8 ± 5.2

* Population of New York State aged 15 years or over on April 1, 1940 (in intervals of 5 years) taken as standard.

TABLE 8.—AVERAGE ANNUAL STANDARDIZED RATES* OF FIRST ADMISSIONS WITH ALCHOLIC PSYCHOSES TO ALL HOSPITALS FOR MENTAL DISEASE IN NEW YORK STATE, 1939–1941, PER 100,000 NEGRO POPULATION, CLASSIFIED ACCORDING TO MARITAL STATUS

Marital Status	Males	Females	Total
Single	58.3 ± 6.8	8.6 ± 2.8	33.1 ± 3.7
Married	35.9 ± 4.0	10.2 ± 2.2	22.8 ± 2.3
Widowed	162.2 ± 27.6	18.0 ± 4.7	88.8 ± 9.2
Separated or divorced	78.2 ± 11.0	21.2 ± 4.8	49.1 ± 5.6

* Population of New York State aged 20 years or over on April 1, 1940 (in intervals of 5 years) taken as standard.

TABLE 9.—AVERAGE ANNUAL STANDARDIZED RATES* OF FIRST ADMISSIONS WITH PSYCHOSES WITH CEREBRAL ARTERIOSCLEROSIS TO ALL HOSPITALS FOR MENTAL DISEASE IN NEW YORK STATE, 1939–1941, PER 100,000 NEGRO POPULATION, CLASSIFIED ACCORDING TO MARITAL STATUS

Marital Status	Males	Females	Total
Single	179.1 ± 28.6	245.0 ± 43.0	230.0 ± 25.6
Married	150.6 ± 14.6	204.8 ± 21.3	188.8 ± 12.6
Widowed	327.4 ± 45.6	211.6 ± 19.8	277.9 ± 20.0
Separated or divorced	243.8 ± 33.5	231.9 ± 35.3	248.1 ± 24.8

* Population of New York State aged 45 years or over on April 1, 1940 (in intervals of 5 years) taken as standard.

Cerebral Arteriosclerosis

The standardized rate of first admissions with psychoses with cerebral arteriosclerosis varied from a minimum of 188.8 in the married group to a maximum of 277.9 among the widowed.

Because of the large probable errors, the sex differences are not reliable. Nevertheless, it, appeared that the single and married males had lower rates than females, whereas the reverse was the case for the widowed, separated and divorced. The lowest rate for males, 150.6, occurred among the married. The highest, 327.4, occurred among the widowed. Among females, however, the highest rate occurred among the single, followed closely by the separated and divorced group. There was little difference between the married and the widowed.

Senile Psychoses

Standardized rates of first admissions with senile psychoses were of a lower order than those for the arteriosclerotic disorders. They were highest among the single (107.4), followed closely by the widowed (103.8). The lowest rate occurred among the separated and divorced.

In general, the rates were lower for males than for females. The highest rate for males occurred among the widowed (111.6). The lowest rate occurred among the separated and divorced. Married males had a higher rate than the unmarried.

For females, the highest rate occurred among the single. The rates for the remaining marital groups were of the same order.

Manic-Depressive

The standardized rates for the manic-depressive psychoses showed an excess for the single group. There were no sensible differences among the remaining groups.

The unmarried had the highest rate among the males. The rates for each of the remaining groups were approximately half that for the single.

Standardized rates for the females were approximately twice those for males. The highest rate occurred among the unmarried. The married and widowed had the same rate, which did not differ significantly from that for the separated and divorced.

Dementia Praecox

As shown in previous studies, the highest rate of first admissions with dementia praecox occurs among the single. The average annual

TABLE 10.—Average Annual Standardized Rates* of First Admissions with Senile Psychoses to All Hospitals for Mental Disease in New York State, 1939–1941, per 100,000 Negro Population, Classified according to Marital Status

Marital Status	Males	Females	Total
Single	46.5 ± 14.6	142.4 ± 32.8	107.4 ± 17.5
Married	80.2 ± 10.7	82.2 ± 13.5	91.4 ± 8.9
Widowed	111.6 ± 26.6	80.9 ± 12.3	103.8 ± 12.2
Separated or divorced	22.0 ± 10.1	80.2 ± 20.8	60.9 ± 12.3

* Population of New York State aged 45 years or over on April 1, 1940 (in intervals of 5 years) taken as standard.

TABLE 11.—Average Annual Standardized Rates* of First Admissions with Manic-Depressive Psychoses to all Hospitals for Mental Disease in New York State, 1939–1941, per 100,000 Negro Population, Classified according to Marital Status

Marital Status	Males	Females	Total
Single	8.3 ± 2.2	13.4 ± 2.9	11.1 ± 1.8
Married	3.4 ± 1.2	7.4 ± 1.8	5.4 ± 1.1
Widowed	4.0 ± 4.3	7.4 ± 3.0	5.7 ± 2.3
Separated or divorced	4.5 ± 2.6	8.0 ± 3.0	6.4 ± 2.0

* Population of New York State aged 15 years or over on April 1, 1940 (in intervals of 5 years) taken as standard.

TABLE 12.—AVERAGE ANNUAL STANDARDIZED RATES* OF FIRST ADMISSIONS WITH DEMENTIA PRAECOX TO ALL HOSPITALS FOR MENTAL DISEASE IN NEW YORK STATE, 1939–1941, PER 100,000 NEGRO POPULATION, CLASSIFIED ACCORDING TO MARITAL STATUS

Marital Status	Males	Females	Total
Single	106.3 ± 7.8	102.0 ± 11.8	104.3 ± 5.6
Married	65.2 ± 5.4	51.7 ± 4.9	58.4 ± 3.6
Widowed	41.0 ± 13.9	44.4 ± 7.3	42.7 ± 6.4
Separated or divorced	69.7 ± 10.4	89.9 ± 9.9	80.1 ± 7.2

* Population of New York State aged 15 years or over on April 1, 1940 (in intervals of 5 years) taken as standard.

TABLE 13.—AVERAGE ANNUAL RATES OF FIRST ADMISSIONS WITH DEMENTIA PRAECOX AMONG NEGROES TO ALL HOSPITALS FOR MENTAL DISEASE IN NEW YORK STATE, 1939–1941, CLASSIFIED ACCORDING TO SEX, AGE AND MARITAL STATUS

Age (years)	Males			Females		
	Single (a)	Married (b)	$\left(\frac{a}{b}\right)$	Single (a)	Married (b)	$\left(\frac{a}{b}\right)$
15–19	88.6	274.3	0.32	85.9	61.0	1.41
20–24	213.7	77.4	2.76	91.4	60.6	1.51
25–29	211.6	68.4	3.09	139.3	81.9	1.70
30–34	168.1	61.4	2.74	187.3	85.1	2.20
35–39	109.0	45.9	2.37	189.2	70.2	2.70
40–44	77.4	46.2	1.68	88.7	34.3	2.59
45–49	59.3	25.1	2.36	78.4	57.7	1.36
50–54	52.7	16.4	3.21	22.3	18.1	1.23
55–59	44.0	12.6	3.49	114.3	31.1	3.68
60 or over	17.2			22.0	10.7	2.06

standardized rate was 104.3 for the single, but only 58.4 for the married. The rate was relatively high among the separated and divorced, but, contrary to other groups of mental disorders, it was lowest for the widowed.

The order was the same for each sex: highest for the single, followed by the separated and divorced, and lowest for the widowed. It is agreed, generally, that the high rate among the single is due primarily to the abnormalities of personality which also operate to prevent marriage (5). There is, nevertheless, some selection with respect to marriage, and the rate of first admissions with dementia praecox is reduced among the married and the widowed. The low rate for the latter must be attributed to the factor of age since widows are mostly within the age range of other groups of mental disorders. The element of personality appears again, however, in the case of the separated or divorced.

SUMMARY

This study of the relative distribution of mental disease according to marital status is based upon average annual rates of first admissions among Negroes to all hospitals for mental disease in New York State from July 1, 1938, to June 30, 1941. Previous studies have shown that there are marked differences in such rates, the single (unmarried) having rates substantially higher than those for the married. This is due in part to the action of marriage, which selects the more stable and healthy and leaves the psychologically unstable within the ranks of the unmarried. However, it is also felt that married life, especially where there are children in the family group, exerts a protective influence which lessens the chance of mental illness. Widows have higher rates than the married, which is usually attributed to the economic stresses following the loss of a spouse, and to the weakening of the feeling of personal security. In general, the separated and divorced have the highest rates of first admissions. This is attributed in part to the unstable personal characteristics of these groups, and in part to the social factors which lead to separation and divorce.

In the case of Negroes, the picture of the distribution of mental disorders is altered somewhat as a result of the instability of the marital status. Thus, the percentage of single was the same for whites and non-whites, aged 15 years or over, in New York State in 1940. However, 56 per cent of the whites were married, compared with 42 per cent of the non-whites; and 4 per cent were separated or divorced, compared with 15 per cent of the non-whites. The latter also included a higher percentage of widowed.

In general, the single had higher rates of mental disease than the married. In fact, the single had the highest rates among all marital groups with respect to dementia praecox and manic-depressive psychoses. The unusual characteristic among Negroes was the high rate for widowers. This group had the highest standardized rate for total first admissions and ranked highest for general paresis, alcoholic psychoses, psychoses with cerebral arteriosclerosis, and senile psychoses. On the contrary, this was not true of widows, who had generally low rates, except for general paresis and the alcoholic psychoses. Within each sex, the range of the rate for general paresis was small (except for widowers). The rates for the single did not differ significantly from the others. This can be interpreted only as indicating the wide prevalence of syphilis, irrespective of marital status. The same characteristic appears in the alcoholic psychoses. Within each sex (again except for widowers) the range of the rates is limited, especially among females. These seem to point to the significance of social factors in the etiology of some mental diseases among Negroes.

Previous studies have shown that the divorced population has, in general, higher rates of mental disease than the other marital groups. Partly, because of the small number of the divorced among Negroes, and the probability that the distinction between separation and divorce is frequently doubtful, it was decided to combine the groups of separated and divorced. On this basis, the rate for the separated and divorced among males was generally less than that for the single but in excess of that for the married. In the case of the females, the separated and divorced had the highest rates for alcoholic psychoses, and the second highest for general paresis, dementia praecox and manic-depressive psychoses. The general average for all psychoses showed that females in this group had a rate second only to that of the single group. Clearly, therefore, separation and divorce were more significant factors in relation to mental disease for females than for males.

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BORDERLINE STATES

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Hoch and Polatin (5) have drawn attention to an important problem which would seem to have been long neglected. The term "pseudoneurotic" conveys the impression of a hidden danger which awaits the psychiatrist in his attempt to reach a diagnosis on which to base his therapy. It has thrown into sharp relief the no-man's-land between neuroses and psychoses, and offers considerable scope for an enlargment of the therapeutic horizon, involving a modification of the methods used by both the advocates of psychotherapy and of the physical treatments.

The term "pseudoneurotic" (also called borderline and latent) schizophrenia as used in the literature refers mainly to those early psychoses which cause diagnostic confusion due to the concurrence of neurotic and psychotic symptoms. It can also refer to those patients in whom the main disturbance is apparently a neurosis with no evidence of schizophrenic involvement. This picture is described by Mayer-Gross, Slater and Roth (9) as follows: "Hebephrenics can carry on diagnosed as 'neurasthenics' and 'neurotics', as regular and chronic visitors to out-patient departments and surgeries, until finally the frequent change of doctors or their fantastic complaints rouse the suspicion of a severe mental illness."

These are the sort of cases generally described as 'borderline', and which are important from a diagnostic and therapeutic point of view. Mayer-Gross, Slater and Roth make only two short descriptive references to the condition, the first quoted above under the discussion of hebephrenia, and the second in connection with atypical and mixed clinical pictures, where they say: "The neurosis-like pictures which may be seen in early schizophrenia, are especially common in slowly progressive schizophrenia,—which, if it begins in an obsessional personality may for a long time remain disguised as an apparently obsessional illness." The authors go on to describe this situation as "the colouring of the psychosis by psychogenic reactions derived from the special environment of the patient and the psychological situation." From this it would appear that when a neurosis precedes a psychosis, or symptoms of both occur together, they are genetically unrelated and the neurosis is only of secondary, if not incidental, importance. These authors state that such neuroses should not be treated by psychological means, yet they do not say how they should be treated.

It is often stated (12) that there is a danger of applying interpretive techniques to such patients. There is a tendency to separate the condition from the main types of schizophrenia, together with an awareness of the special problems involved in its treatment. Our increased knowledge of the psychology of the psychoses can be directly attributed to the influence of psychoanalysis, yet when one reflects on a statement by Obendorf (10) that many failures of classical analysis are due to the patients' being borderline psychotics, two facts emerge: 1) that there is an inadequate awareness of the extent of borderline psychosis, and 2) that a different technique is required to treat the borderline states from that used in the neuroses.

Misdirected Therapy

The consequences of misdirected therapy for such borderline cases can be demoralizing for the therapist and disastrous for the patient. Psychoanalysis and its derivatives are not the only forms of treatment which can be dangerous. Advocates of abreactive techniques advise caution when using ether and other abreactive agents with obsessional neurotics. Shorvon (13) says: "Particular care must be taken with obsessional patients who are paranoid, as these traits become worse as a result of injudicious treatment (abreaction). The drug should be discontinued or restricted to a small dose." Lindner (8) deprecates the use of hypnosis in a patient whose ego is fragmented. He says: "To violate this limitation is a hazardous and clinically ill-advised undertaking. It is not only wasteful of effort, but runs an almost certain risk of precipitating a psy-

chosis, or, in the presence of psychosis, of shattering beyond repair what remnants there are on which other therapy could have capitalised."

Incidence

With these thoughts in mind, it is useful to consider the incidence of borderline syndromes in the U. S. A. as given by Eisenstein (2) of New York. In private psychiatric and agency practice, he found that of 250 consecutive consultations, 30 per cent were borderline reaction cases. Piotrowski and Lewis (11) also in New York reported that 50 per cent of patients (20–41), who had been discharged from the New York Psychiatric Institute with a diagnosis of psychoneurosis, developed definite signs of schizophrenia in the interval between discharge and follow-up some years later. In another investigation Woltman (15) found that 30 per cent of diagnostic referrals of private adult patients were in the borderline class.

These figures indicate that more attention should be given to diagnosis in doubtful cases, especially by those whose main interest is in the psychoneuroses and their treatment. The importance of this problem can further be gauged by remembering that Freud was acutely aware of it when he was developing his technique (6). Anxious to find a favorable reception for his methods, he was careful not to treat unsuitable cases and sought to protect the reputation of psychoanalysis by weeding out latent psychotics. His practice therefore was to conduct a trial period for new patients, lasting two weeks, during which time he would not interpret, but merely observe the trend of associations.

Characteristics of Borderline Cases

The first consideration is diagnosis, and the following facts concerning these cases have been observed by Douglas (1): "The patient is markedly ambivalent and associates in a primitive symbolic way, discussing incestuous and other sexual material in an uninhibited manner that is rare in the neurotic." Knight (7) has noted peculiarities of word usage, obliviousness to obvious complications, inappropriate affects and suspicious behavior. He remarks that the observer must be aware of the degree to which the patient accepts these peculiarities or is embarrassed by them. Gutheil (4) has remarked on the blankness of the expression in the latent schizophrenic, and Knight sums up the fundamental disturbance in borderline cases as a severe weakening of (c.f., the psychotic loss of) the normal ego functions, such as secondary process thinking, integration, realistic planning, adaptation to the environment, maintenance of object relations and defenses against primitive unconscious impulses.

Treatment

The actual therapeutic approach has been described in some detail by Federn (3), Wolberg (14), and also by Eisenstein (2). Eisenstein divides it into three distinct phases: 1) initial phase, 2) therapeutic working alliance and 3) weaning.

In the initial phase the therapist must take a controlling attitude in contrast to the usual passive approach which is adopted in psychoanalytic psychotherapy. The main problem at this stage is to establish a working relationship. Although the therapist may occasionally be permissive, he must at all times be firm, lest the patient's anxieties be roused to such an extent as to lead to his terminating treatment.

Eisenstein (2) warns that these patients cannot easily form relationships which might result in inner change. Nevertheless, conscious positive transference can be quite marked, even in the presence of severe thought disorder. Federn (3) has noted that transference cures occur with these patients as with neurotics. The positive transference is the therapist's greatest ally. Unfortunately, it is notoriously unstable, giving way to a negative relationship which may prejudice the therapeutic outcome.

In many cases the treatment does not extend beyond the initial phase, owing to the transference improvement, but when it does, the main problems are those of the patient's guilt and anxiety. These must be met with reassuring explanations in order to increase the strength of the ego. Most important is reassurance over homosexual thoughts. The careful handling of ambivalence and the necessity of preserving the positive transference must be given attention.

Not the least important is the weaning phase, corresponding to Federn's conception of the patient's continued dependence on the therapist. The aim is not to make the patient independent as with a neurotic, but to help his damaged ego to function at a higher level of integration. This phase is therefore necessarily long. It is a mistake to discharge the patient when the stage of previous normality is reached. Regular appointments should be made where possible, for a considerable time after recovery, or relapse may occur. Federn's (3) summing up of the therapeutic attitude is: "Do not provoke. Do not try too vigorously to elucidate the basic conflict; master your psycho-analytic interest and your eagerness to understand your case fully; postpone your desire to obtain the history of past psychotic episodes."

Other Conditions Qualifying as Borderline

Clinical observation suggests that the syndrome of the borderline state can be widened to include conditions other than the pseudoneurotic form of schizophrenia. The case histories detailed below are presented to support this view. The paranoid reaction is a good example of a syndrome which can be usefully included in the borderline state. This reaction often occurs in the absence of neurotic symptoms and is described by Mayer-Gross, Slater and Roth (9) as a temporary or chronic paranoid symptom occurring in an "intact personality", i.e., one in which the primary delusions characteristic of true schizophrenia do not appear. These authors consider the condition to be due to environmental influences, placing it in the same category as a neurotic symptom. They say it is curable by environmental adjustment and superficial psychotherapy after which the personality is left "intact". As Mayer-Gross *et al.* (9) point out, not all paranoid reactions are benign in nature. Even the milder forms indicate a severe personality disturbance, however temporary, as indicated by the loss of reality testing. This fact alone justifies including these paranoid states in the borderline group. There seems little reason to separate the paranoid reactions from the borderline schizophrenics, especially when it is considered that their coexistence with neurotic symptoms makes possible a diagnosis of pseudoneurotic schizophrenia. Cases 1 and 2 illustrate the diagnostic problems found in paranoid patients.

As well as these additions to the borderline types, Gutheil (4) has recently described a pseudoneurotic depressive psychosis. Patients observed over long periods show recurrent neurotic breakdowns, followed eventually by a depressive reaction. Gutheil believes that in these cases, the neurotic symptoms act as protective devices for the ego, just as in pseudoneurotic schizophrenia, but a clinical distinction may be made between the two groups. In pseudoneurotic depressive psychosis, the facial expression is usually tense rather than blank and expressionless as in the pseudoneurotic schizophrenic. Also, the introjection of aggression, pessimism and a strict superego with self reproach which characterizes the pseudoneurotic depressive do not appear in the pseudoneurotic schizophrenic. Gutheil stresses the difficulty of early diagnosis, but shows how projection tests may reveal something of the defensive and adaptive capacity of the personality. Case 6 in this series is offered for inclusion in this category although it differs in many respects from those cases described by Gutheil.

Case Histories

Case 1: A young unmarried man of 20 came for help because he thought the ideas with which he was preoccupied were irrational. He claimed that while working in the mental hospital sewers with a stick, the stick became infected with gonorrhea, the organisms of which were transferred through the wind on to his body, so that he became a carrier of the disease. He felt that this was so because shortly afterwards his mother developed conjunctivitis, which he believed was gonococcal in origin, and which could have been contracted through using his towel. At the same time as he thought these ideas irrational, he was afraid of spreading the disease.

The interviews were conducted mostly at his level, which resulted in the therapist's undergoing a cross-examination on the bacteriology of gonorrhea, and trying to show that the patient's various premises were wrong. It was surprisingly difficult to do this as his knowledge of the subject was fairly full, but a firm stand was taken contrary to his own arguments. The desired effect of disproving his doubts was never quite achieved, but over a period of three months and ten irregularly spaced interviews, he admitted to a considerable improvement in his state of mind. His

assessments at different times included such statements as: "A bit better. The trouble seems a bit more ridiculous now." "Improving slowly, more rational and less concerned about it." There seemed to be no immediate danger of deterioration, probably due to the protection accorded by his obsessional personality, various aspects of which bothered him to the extent that after several interviews he inquired about the possibility of treatment for them, but was deterred by the therapist's stressing the length of time required. On this basis, he could perhaps be called pseudoneurotic, but the paranoid ideas suggested that a diagnosis of paranoid reaction could be made. However, reasoning along the lines taken by Mayer-Gross, Slater and Roth, this would be a case of early schizophrenia, arising in an obsessional personality, as these authors do not describe separately the situation where neurotic symptoms accompany a paranoid reaction. What is certain, however, is that his personality was unstable. It was, in fact, a state bordering on psychosis. The descriptive term "borderline" would seem to be adequate, giving a more accurate impression of what is happening to the patient.

Case 2: The patient was a married man of 34 with marked thought disorder and a well-developed chronic delusion about an influencing machine. He could give only a poor account of himself and his previous breakdowns. He explained that he was worried in case his ideas meant he was insane. He said he would be happy if the therapist could be available to him when he felt he needed to see him, and he did this at intervals of three weeks to two months, never coming more than three times for each episode. Very little was required other than to reassure him that he was doing all right and he should not worry, after which he would be very grateful and go away strengthened. All this time he was supporting his wife and family; yet whenever he came for help, his thought disorder was very involved and much of his speech so disconnected as to be incomprehensible. It would seem that a part of his personality was relatively healthy and responded to transference.

Case 3: The patient was a single girl of 28. Her parents had insisted that she come for consultation, although she was unwilling. She realized that things were not as they should be and complained of an inability to stop thinking about a young man to whom she had been attached some eight years previously. Information obtained from the family made it clear that she had an obsessional personality, and since her broken romance, she had suffered from transient paranoid symptoms with a tendency to become quiet for several weeks at a time, in a manner suspicious of schizophrenia. At the time of consultation, this had become worse and was the main problem. She had become withdrawn, causing the family great concern.

She came only three more times; the discussion usually concerned her hostile feelings toward her parents, which also extended to her brother and sister-in-law. Each time she was very doubtful about coming again as she felt her problem was a matter of her parents' attitude. The venting of hostility may have helped, as she improved. Soon afterwards she obtained a nurse's aide position and had maintained her remission for some months when last heard of.

It is obvious that on the basis of an obsessional personality, the stress of a disappointing love affair had precipitated an obsessional neurosis which staved off a paranoid psychosis. This is a typical case of psuedoneurotic schizophrenia, i.e., a borderline state, where the primary delusions of true schizophrenia have yet to appear. Again, this diagnosis could be contested by putting forward the alternative of slowly developing schizophrenia with an obsessional personality. There is no doubt of the schizophrenic quality of the illness, but the latter alternative does not convey any impression of the defensive struggle taking place, rather it gives a feeling of the inevitably progressive nature of the disease.

Case 4: The patient was an unmarried woman aged 36 who came on her own account, asking to be cured of an intermittent stutter of some 20 years' duration. The stutter was only apparent when talking to strangers and when using the telephone. It was accompanied by severe anxiety. It had seriously interfered with her relations with men, causing her to break off any association because of the embarrassment it caused.

During the three months prior to coming for treatment, there had developed ideas of reference. There was the feeling that people were pointing her out, that she was notorious because of an abortive love affair she had had, and this caused her to leave her home in the country and seek treatment, something she had long been planning but had never got around to. Lately, the anxiety had become almost continuous.

She proved to have an obsessional personality with schizoid tendencies. After the first interview she admitted to feeling much less tense and less worried about people in the street, but soon became restive and concerned about the expense of the treatment and whether it would help her. She felt that just talking was no good to her. The ideas of reference recurred, and she gradually became so negative that after the sixth interview she said she would not come any more. It was obvious on looking back that the silences disturbed her and that analytic psychotherapy was not suitable. However, she was no worse for it, and some weeks later she was working as a salesgirl, graduating from this to a clerical job, which she retained for many months. This patient showed the clinical features of a typical case of pseudoneurotic schizophrenia.

It is difficult to say whether she would have persisted even with different treatment, as there was a definite demand for something to be done quickly about the stutter and anxiety. She illustrates the difficulty so often found in dealing with these patients, viz., their intense ambivalence, which seems to undermine their interpersonal relationships. An interesting feature of this case is that, although the patient was subjected to the analytical procedure, no psychosis was precipitated. An explanation that seems to suggest itself is that mild negative feelings which are provoked early in the treatment result in its termination before any acute disturbance can occur.

Case 5: The patient was a single man aged 28 years, recovering from a recurrent schizophrenic episode which had been shortened with E.C.T. He came of his own accord. He wanted to undergo psychoanalysis in order to straighten himself out and prevent further breakdowns. He could not quite grasp how the treatment could achieve what he wanted, and during the second interview he said: "It seems a peculiar process to me." He was given constant reassurance, however, and agreed to persevere.

There were no specific neurotic complaints except a mild anxiety. He felt confused and worried about his thoughts and hoped the treatment would help him.

With some encouragement he began to talk, and his associations were of an uninhibited type. He would say he wasn't sure if they were true, but went on to relate misdemeanors of which he was accused. He was supposed to have made girls pregnant at school and been expelled because of it. Throughout the treatment he would remember further sexual episodes which were eventually shown to be fantasies. When it was pointed out to him, he agreed that the episodes could have originated in his own mind. All the supposed affairs were related in a matter of fact way as if he were telling a story about someone else.

One of his main problems was his temper, which had prompted him to violent acts on occasions. He remembered putting a headlock on a cousin at a party and not letting go. Another time a cousin introduced him as a "Brazilian relative", and the patient struck him. Asked why the strange introduction, he said: "Oh, I suppose it's because I'm a nut." He said that when he acted ridiculously at parties, he was treated as abnormal and was always afraid he would become violent. Asked why he acted in this way, he related it to masturbation in his youth, about which he felt guilty.

He began to feel better soon after commencing treatment, and his family was very pleased with the improvement although he still spoke in a vague manner of his fantastic adventures. He said one day he was bothered about what he had told me concerning a certain girl with whom he had had an affair. He seemed to have forgotten the details, but added that his mother had assured him that nothing took place. Then followed an involved story of an affair he felt he had had with his boss's daughter, after which he committed adultery with the boss's wife. He said the latter part was a memory and not just a feeling. This led on to his wanting to strangle a man he found in bed with his sister who had been drugged for the purpose. When he was told that his hostile feelings frightened him, he said that he felt he wanted to shoot his father. He told how people had threatened to shoot him for saying obscene things to an aunt who had said he tried to have intercourse with his mother. This upset him so much he tried to shoot himself in the head and was sure his father saw it happen.

Two important problems occurred from time to time, and in retrospect it can be seen that the treatment revolved around their solution. One was the feeling that his head had been damaged years ago by a shotgun fired by some woman's outraged husband, and that the damage so caused had initiated his present mental disturbance. The other was the intermittent recurrence of a rectal pain.

In order to solve the first problem, he first felt out very carefully the state of his relationship with the therapist. He had a dream: "Something to do with tennis. I couldn't return the ball so I gave it up." This was eventually interpreted as his fear of running out of conversation so that the therapist would become annoyed with him. In the next interview he reopened the subject of his being shot in the head. He was doubtful as to what really happened because his father hushed the business up. The session closed with his being told that any measures would be justifiable in order to test the truth of his accusations re his head. In the following interview he came back cautiously with a request to have his skull x-rayed as it had been explained the previous time that such an investigation would prove once and for all the validity of the shotgun affair. This favor was readily granted, and the result eased his mind very much.

The other problem was the rectal pain which aroused his fears of being a homosexual, and great care was taken to acquaint him with the difference between an interest in his rectum, into which he said he used to insert things, and a homosexual. As he had never had sexual thoughts about men, he was greatly reassured. Later, he brought up the subject of his pain once more and was reassured that it did not result from masturbation.

The improvement continued, and although his efforts to return to work were somewhat desultory, his parents were confident that he was considerably brighter around the house and occupied himself much more. He went on a holiday after about six weeks' treatment, and on returning said he felt fine, but that the rectal pain had recurred. He asked if he could be examined by someone, and an appointment was made for him with a surgeon, who reassured him, apparently to his satisfaction.

This case shows how important liaison with the family can be, a point most authors insist on, but which is not always possible. A friend of the family was well known to the therapist, and instructions as to how best to treat him at home were eagerly sought and gratefully received.

Case 6: The patient was a single girl of 21 years, a school teacher who came unwillingly at the request of her guardian. The patient, who had a particularly tense expression, felt there was no hope for her. She said she felt wicked because of neglecting to fulfill her duties, owing to lack of will power. There was an admission of not having any feeling for people and not enjoying anything. Also, she could not make decisions. She was unable to feel anything on one half of her body and was sure she was destined for hell. There was a childish artlessness about her and a strong vein of religiosity. She felt she had killed love with too much self indulgence, i.e., with food, and that even if God forgave her, she would be unworthy of forgiveness.

The picture was atypical and complicated, with obsessional personality features and marked depressive qualities as well as a distressing depersonalization. The presence of such bizarre ideas of which she was firmly convinced pointed to a severely deranged personality. At the third interview she had improved markedly. Unfortunately, she soon slipped back and was worse than ever. When E.C.T. was mooted, she became frightened and begged for a reprieve. This was granted and her improvement was almost immediate. She left the therapist but settled into a state in which she functioned quite efficiently at a less stressful job, while having supportive therapy for a long period from another therapist. This case was difficult to manage because of the patient's poor motivation, and illustrated a precarious ego state, changing from day to day. Despite the pronounced reactive features, she could not be diagnosed purely and simply as neurotic. While she was anxious and depressed, with a tense expression, features which seemed to indicate neurotic depression, this diagnosis would hardly apply as there was a severe disturbance of reality testing implied in the complete acceptance of her guilt.

On the one hand, there was a thought disorder of a type usually found in a depression of psychotic intensity, which would be expected to require E.C.T. in order to achieve remission. On the other hand, the patient reacted sharply to environmental stimuli, and the thought disorder disappeared spontaneously, to be followed by a gradual adjustment to her life situation. In this patient there seems to be an admixture of both neurotic and psychotic elements, but while she could not be called pseudoneurotic, there seems to be no reason why her serious condition could not be described as a borderline depressive psychosis.

Conclusions

The one factor common to these various conditions is a weak ego. It appears that such an ego is best held together by defenses of a neurotic type, whether they are in the form of symptoms or of strongly developed character traits. The most disturbed patients were cases 2 and 5, where neurotic defenses were least prominent. They managed to function sufficiently well to maintain themselves in society when the ego in each case was strengthened by psychotherapy.

The therapeutic techniques for borderline cases are fundamentally those of ego strengthening. When a patient is suffering from a weak ego with indications that an incapacitating psychosis is a possible development, it would seem legitimate to classify the case as borderline, whether or not it conforms to the pattern of pseudoneurotic schizophrenia. Such a description would be worthwhile if only to indicate the therapeutic possibilities.

There can be no doubt that in case 5 the patient's ego was in an intermediary position between psychotic breakdown and the solitary schizoid state in which he usually existed. He conformed to the clinical description of pseudoneurotic schizophrenia, but did not display any neurotic symptoms, a fact which seems to indicate that such features described as characteristic of pseudoneurotic schizophrenia represent a certain level of ego function which may become manifest during the progress of the illness towards both exacerbation and remission. In this case, the patient was moving towards remission and sought help at a time when the ego was highly receptive to a supportive technique. There seems no reason why such transient ego states should not be included in the borderline category.

Summary

A summary of the literature dealing with pseudoneurotic or borderline schizophrenia has been presented together with reasons, illustrated by case histories, for enlarging the borderline category to include other clinically distinguishable conditions which may eventually develop a schizophrenic or depressive psychosis. These states may be approached therapeutically by a psychotherapy designed to support the ego, thus preventing the onset of psychosis.

I wish to thank Dr. Thomas Freeman of Glasgow for the help which he gave me in the preparation of this paper.

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CHEMOTHERAPY WITH AZACYCLONOL IN MENTAL ILLNESS[1]

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For the past three years, several new drugs have become available in the psychiatrist's armamentarium for the treatment of mental illness. Chemotherapy with drugs such as reserpine, chlorpromazine and pipradrol[2] has gained a place in the clinical management of both neurotic and psychotic conditions. Fabing (1) has proposed that the generic term, ataraxics, be adopted for these pharmacologic agents, in that they bring about ataraxy, which may be defined as a state characterized by peace of mind and freedom from confusion.

Azacyclonol[3] has recently been added to the ataraxic group of drugs. It is described chemically as α-(4-piperidyl) benzhydrol hydrochloride.

Fabing (2) has reported the use of this drug as a blocking agent against experimentally induced psychotic states when LSD-25 and mescaline are administered. Young male subjects, who had developed a schizophrenic-like psychosis after ingesting LSD-25, did not experience any psychotic symptomatology when the second administration of LSD-25 was preceded by their taking azacyclonol daily for one week prior to the experiment. When the subjects did not receive azacyclonol before LSD-25, the induced psychotic picture could be abruptly terminated when the blocking agent was given intravenously. Psychotic states produced by mescaline were also controlled by azacyclonol in the same manner.

Fabing and Hawkins (3) have recently reported their experience with azacyclonol in the treatment of 115 patients with mental illness. These authors found that one-third of acute schizophrenic patients would be relieved of the psychosis when placed on azacyclonol. In cases of chronic schizophrenia, only a small number of patients were affected similarly. They also have had a few dramatic results in psychotic reactions following chronic alcoholism, in post-operative confusional states, and in disassociative reactions which occur in senile patients with organic brain disease. They have found that when a patient with schizophrenia responds to the drug, it is necessary to keep the patient on a maintenance dosage of the drug to prevent relapse. With their patients, the duration of the treatment and the dosage of azacyclonol were variable.

Rinaldi, Rudy and Himwich (5) confirmed the earlier report of Fabing and Hawkins. They administered azacyclonol to 38 chronic disturbed schizophrenic patients, after first evaluating the patients' clinical pictures while receiving placebo medications. Then azacyclonol was substituted for the placebo in a group of the patients, without the investigator being aware of which medication the patients were receiving. Each group of patients received placebo medications for three four-week periods, and each group received azacyclonol for one four-week period. In the latter instances the patients were given 10 mgm. of the drug twice daily. Employing this double-blind investigative technique, these workers evaluated the group of patients clinically each two weeks, using a wide-range psychiatric profile of symptoms. They concluded that there was significant improvement in a large proportion of the patients, 21 out of 38, to warrant further use of azacyclonol in treating chronic patients with psychoses.

The purpose of this report is to present the preliminary findings in a study when azacyclonol is administered to a group of mentally ill patients, similar to those reported by Fabing *et al.* The authors have given this drug to a group of 20 acutely psychotic patients and 11 chronically disturbed individuals.

METHOD OF STUDY

During the initial phase of the study, large oral doses of the drug were given to the patients, 400–800 milligrams daily. This was preceded in most instances by injecting

[1] From the Department of Psychiatric Research, New Hampshire State Hospital, Concord, New Hampshire.

[2] Pipradrol is manufactured under the trademark, Meratran, by The Wm. S. Merrell Company, Cincinnati, Ohio.

[3] Azacyclonol is manufactured under the trademark, Frenquel, by The Wm. S. Merrell Company.

100 milligrams of the medicine intravenously. As other information became available concerning the dosage of azacyclonol (4), the following dosage schedule was adopted: For the first three days of treatment, the patient receives 100 milligrams of the drug intravenously, twice a day. On the fourth day, the patient is placed on oral medication, receiving 40 milligrams four times daily. This program is carried out for four to six weeks, at which time, if the clinical picture has not changed sufficiently, the medications are discontinued, and the patient is placed on other psychiatric treatments. Usually most changes in the clinical symptomatology have occurred by the end of the second week of treatment.

To evaluate the results and changes in the clinical picture of each patient, the following specific symptoms were evaluated at weekly intervals while the subjects were receiving the medication: Disturbance of mental association, disturbance of affectivity, presence of delusions, presence of hallucinations, states of stupor, and states of excitement. In the latter category, the presence of agitation and/or turmoil states was classified collectively.

Results

The dosage schedule outlined above has been found to be adequate in treating mental illness with azacyclonol.

Table 1 summarizes the results obtained in the group of 20 acutely ill patients. These results have been tabulated as follows: Ceased, meaning that the symptom disappeared during the course of treatment; improved, that the symptom became less prominent; and unchanged, that the symptom persisted.

It is to be noted in table 1 that in all symptom categories, except presence of delusions, the symptoms ceased or improved in 50 per cent (states of stupor) to 92 per cent (disturbance of affectivity).

Table 2 summarizes the results obtained in the group of 11 chronically disturbed patients. The results have been tabulated as they were in table 1.

It is to be noted in table 2 that in only two of the symptom categories, disturbance of affectivity and presence of hallucinations, were the results, in terms of improvement, over 50 per cent in each instance.

In this study the best responses to azacyclonol occurred in the acutely ill patients. The group of 11 chronic patients did not respond as well to the treatment program. When the azacyclonol was discontinued in those who did show some degree of improvement, the clinical picture reverted to its previous state.

No complications or side affects were noted while this group of 31 patients was receiving azacyclonol.

The psychosis of three patients in the acute group responded dramatically when treated with azacyclonol. The medication was gradually reduced over a four-week period, and after several weekend visits at home, the patients were released from the hospital symptom-free, to be followed in the outpatient clinic. Each of these three patients is taking 20 milligrams of azacyclonol three times a day as maintenance therapy. One patient was released on a dosage of 20 milligrams twice daily, and her dosage was increased to three times daily when other information became available describing maintenance treatment (4). One of these patients stopped taking her medication for five days. When she became aware of nervousness, restlessness, etc., she immediately went back on the tablets and was symptom-free again in three days.

TABLE 1.—Acute Group of 20 Patients

Symptom	No. of Patients with Symptoms	Number Ceased	Number Improved	Number Unchanged	Per Cent Ceased	Per Cent Improved	Per Cent Unchanged
Disturbance of association	16	7	5	4	44	35	21
Disturbance of affectivity	12	9	2	1	75	17	8
Presence of delusions	16	3	2	11	19	12	69
Presence of hallucinations	15	9	3	3	60	20	20
States of stupor	4	2	0	2	50	0	50
States of excitement	9	6	2	1	66	22	12

TABLE 2.—CHRONICALLY DISTURBED GROUP OF 11 PATIENTS

Symptom	No. of Patients with Symptoms	Number Ceased	Number Improved	Number Unchanged	Per Cent Ceased	Per Cent Improved	Per Cent Unchanged
Disturbance of association	10	0	4	6	0	40	60
Disturbance of affectivity	7	0	4	3	0	57	43
Presence of delusions	9	0	1	8	0	11	89
Presence of hallucinations	9	1	4	4	11	44.5	44.5
States of stupor	1	0	0	1	0	0	100
States of excitement	0	0	0	0	0	0	0

Four of the acute patients did not respond to to the treatment regime. Together with the other 13 patients who did not totally recover when given azacyclonol, they all have subsequently received other more drastic treatments, such as electroconvulsive therapy, and either have been released from the hospital or are making weekend visits to their homes, anticipating discharge shortly.

The following case report reveals the dramatic and fascinating response in one young woman with schizophrenia, who was treated with azacyclonol.

CASE REPORT

T. C., a 32-year-old housewife and weaver, was admitted to the New Hampshire State Hospital on July 2, 1955. She had previously been hospitalized three years before for an almost identical psychotic illness. The duration of her hospitalization for the first admission was six months; she received electric shock treatments and had a slow convalescent period.

The following symptoms characterized the psychotic picture at the time of the second admission: marked dissociation, delusions of persecution, constant visual and auditory hallucinations, moderate excitement, tension, anxiety and rigidity. Her affect was usually appropriate with her frightening content of thought. At times she became tearful without explanation.

For the first four days she was resistive and at times tended to become assaultive. She was in seclusion 24 hours a day, except when she received hydrotherapy during active treatment hours. Her appetite was poor, and she did not sleep.

On the afternoon of the fifth hospital day, she was given 100 mg. of azacyclonol intravenously over a five-minute period. Half way through the injection a dramatic change occurred in the patient's physical appearance. She relaxed, was not tense or anxious, and when questioned 30 seconds later, she stated that both the visual and auditory hallucinations had stopped.

Thirty minutes later, she was out on the ward wearing hospital clothes. She had a bewildered expression on her face and constantly asked the interviewer, "What have you done with him?" (Her visual hallucinations had mainly been that of her dead twin brother. In addition, she also saw other members of her family and religious figures.) She began taking nourishment that evening and was placed on oral medication, 200 mg. four times daily.

For the following four nights the patient continued to be sleepless. She sang a great deal. When questioned about this, she stated, "I feel happy. I just feel good." None of the above listed symptomatology was present during this interval.

After the fourth night the patient suddenly became composed and adapted to a normal amount of activity and verbal productivity. Her medication was changed the following day to 60 mg. four times daily. She maintained her good improvement for the next two weeks, and azacyclonol was reduced to 40 mg. four times daily. The following week the drug was reduced to 20 mg. four times daily, and she began making weekend visits to her home. During the next month, the medication was reduced to 20 mg. twice daily. The clinical picture remained unchanged, and she was released from the hospital symptom-free on September 9, 1955, to be followed in the out-patient department.

Comment

The results in this study are much the same as has been reported by other investigators. In evaluating the responses noted in relation to symptom categories, azacyclonol seems to be definitely indicated in patients who present a clinical picture with marked disturbance of association, disturbance of affectivity and with hallucinations. Each of these patients in this study was an acutely ill schizophrenic individual. The treatment schedule outlined above has been satisfactory in administering the medication to the patients. When using this treatment program with azacyclonol, an evaluation can be made between the second and fourth week as to whether the patient whould continue this medication or whether more drastic treatments should be instituted. Although the authors realize that such a small number of patients as reported in this study is not statistically significant, they are encouraged with the results obtained in the acutely ill schizophrenic patients. They feel that it is worthwhile to administer azacyclonol to newly admitted schizophrenic conditions.

Azacyclonol as used in this series of patients has not caused complications or unpleasant side affects as may be experienced occasionally with the use of reserpine and chlorpromazine.

The authors wish to express their appreciation to George M. Haslerud, Ph.D., Professor of Psychology, University of New Hampshire, and Research Consultant for the New Hampshire State Hospital, for his assistance in the preparation of the manuscript.

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CHLORPROMAZINE (THORAZINE) AND RESERPINE IN RESIDENTIAL TREATMENT OF NEUROPSYCHIATRIC DISORDERS IN CHILDREN

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The use of chlorpromazine and reserpine in the treatment of neuropsychiatric conditions in adult patients has been reported by many authors. At the time of this writing only a small number of publications evaluating the use of these two medications in children has appeared in the literature. This report is based upon observations on 74 patients in residential treatment in the Children's Unit at the New Jersey Neuro-Psychiatric Institute. They represent a variety of diagnostic categories that occur in children of this age group. The exact diagnostic classification and age of the 74 patients (20 receiving chlorpromazine and 54 reserpine) are seen in table 1.

Material and Method

As can be seen, the majority of these patients, 35 in number, are classified as schizophrenics. Seventy-five per cent of the children in this group presented a clinical picture of mild degree of deterioration, autism, bizarre and manneristic behavior. Twenty-five per cent in this category of schizophrenic reactions consisted of hyperactive, aggressive and frequently agitated youngsters.

Twenty patients diagnosed as "Chronic Brain Syndromes" and eight as "Mental Deficiency with Psychotic Reactions" were included in this study because they were the most difficult patients to manage from the standpoint of ward-and-nursing care. Hyperactivity associated with brain damage in children and psychotic-like behavior of mentally defective young patients displaying their destructive, primitive and hostile impulses required always greater supervision, frequent use of sedatives, at times partial restraints, and in some cases electroshock treatments.

Five patients with "Personality Disorders" and six considered as "Adjustment Reactions" were selected with the hope that tranquilizing drugs may effect their assaultive and antisocial behavior.

These 74 patients resided in three different buildings within the Children's Unit. Daily and weekly observations and evaluations of individual children were made by ward personnel of three different shifts, the supervising nurse and the physician in charge, and the data were recorded.

Clinical and Laboratory Tests

Temperature, pulse rate, blood pressure, leucocyte, hemoglobin, erythrocyte sedimentation rate and urinalysis for bile pigment were examined at the outset of the treatment once a week and subsequently every 15 days. Cephalin-cholesterol flocculation test, Icteric Index and alkaline phosphates test were done

TABLE 1

Chlorpromazine Patient's Age (years)								Diagnosis	Reserpine Patient's Age (years)									
7	8	9	10	11	12	13	Total		Total	15	14	13	12	11	10	9	8	7	6
	2	1	1	1	1	1	7	Schizophrenic reaction, childhood type	28	1		3	4	3	2	7	2	4	2
1		2		1	1	1	6	Chronic brain syndromes with qualifying phrases	14			2	3		4	1	2	1	1
1		1			1		3	Adjustment reactions of childhood	3				1	1	1				
					1	1	2	Mental deficiency with psychotic reactions	6						3	2			
				1	1		2	Personality disorders	3		1		1	1					
2	2	4	1	3	5	3	20	Total	54	1	1	5	9	6	10	10	4	5	3

every 15 days on all patients receiving chlorpromazine.

Dosage

All patients were started on the initial, oral dose of 10 mg. chlorpromazine daily or on 0.25 mg. reserpine daily. These doses have been increased gradually depending upon individual patient's tolerance of the drug. Because most children with psychiatric disorders have considerable fears and anxiety and because one may inflict on these children (as frequently observed) marked emotional or psychic trauma, the drugs were not administered parenterally. The dosage is arranged in tables 2 and 3.

TABLE 2

Chlorpromazine Daily Dosage				Diagnosis	Reserpine Daily Dosage					
40 mg.	30 mg.	20 mg.	Total		Total	0.5 mg.	1.0 mg.	2.0 mg.	3.0 mg.	4.0 mg.
2	1	4	7	Schizophrenic reaction, childhood type	28		3	17	8	
3	2	1	6	Chronic brain syndromes with qualifying phrases	14		3	8	2	1
1		2	3	Adjustment reactions of childhood	3			2	1	
	1	1	2	Mental deficiency with psychotic reactions	6	1		5		
		2	2	Personality disorders	3		1	2		
6	4	10	20	Total	54	1	7	34	11	1

TABLE 3

Chlorpromazine Duration of Treatment					Diagnosis	Reserpine Duration of Treatment							
12 weeks	13 weeks	18 weeks	23 weeks	Total		Total	34 weeks	28 weeks	25 weeks	18 weeks	10 weeks	7 weeks	2 weeks
5			2	7	Schizophrenic reaction childhood type	28	4	16	1		1	6	
2	3	1		6	Chronic brain syndromes with qualifying phrases	14	4	2	2	2	1	2	1
2		1		3	Adjustment reactions of childhood	3	3						
2				2	Mental deficiency with psychotic reactions	6	2	2		1			1
2			2	2	Personality disorders	3	1		1			1	
13	3	2	2	20	Total	54	14	20	4	3	2	9	2

TABLE 4

Chlorpromazine Degree of Improvement				Diagnosis	Reserpine Degree of Improvement			
Minimal	Moderate	Marked	Total		Total	Marked	Moderate	Minimal
2	4	1	7	Schizophrenic reaction, childhood type	28	9	9	10
1	2	3	6	Chronic brain syndromes with qualifying phrases	14	4	5	5
	2	1	3	Adjustment reactions of childhood	3		1	2
1	1		2	Mental deficiency with psychotic reactions	6	1	1	4
1		1	2	Personality disorders	3			3
5	9	6	20	Total	54	14	16	24

Side Reactions

During the first, second and third week after administration of these drugs, about two per cent of the patients were shown to have elevated leucocytes and eosinophilic cells. These symptoms cleared up entirely after that time. In a group of 18 patients on reserpine, a minimal, asymptomatic lowering of the diastolic blood pressure from 5 to 12 mm. Hg was observed. Seven patients on chlorpromazine and 22 on reserpine suffered from a mild and transient diarrhea, which has cleared up without modification or alteration of the drug's dosage.

Results

The results of this study are summarized in table 4.

The following definitions were utilized in determining the degree of improvement:

(1) *Marked improvement.* (a) Patients who were hyperactive, noisy and resistive with frequent temper tantrums, destructive, bizarre and manneristic behavior have shown almost complete alleviation of their symptoms with considerable lessening of their psychomotor activities. These patients became more sociable and adaptable to the adjustment on the ward; they became more cooperative in feeding, dressing and general nursing and psychiatric care.

(b) Hypokinetic, withdrawn, seclusive, autistic, self-preoccupied and regressed patients have shown gradually more alertness to their environment, better interest in the play activities and recreations. Many of these patients became less inhibited, and their ability to relate to others seems to be quite expanded. Some of these patients have shown dramatic increase in their vocabulary; especially those previously handicapped due to partial mutism or fragmented speech have become more accessible to the verbal level of approach. Many of these patients have been started on speech therapy.

(2) *Moderate improvement.* The objective improvement as mentioned above (in 1 (a) and 1 (b)) was rather brief and transient in this group of patients, with reoccurrence of previous abnormal behavior and pathological features.

(3) *Minimal improvement.* These patients did not respond to treatment, or some of them have shown improvement only in one phase of their attitude toward environment, in their affect, emotional feelings and mood or in the area of motor or speech coordination.

Conclusion

In this study of the 74 children treated with reserpine or Thorazine, marked or moderate improvement has occurred in 65 to 81 per cent of the cases, depending upon type of diagnostic group and the particular drug as shown in table 4. It can be concluded that chemotherapy seems to be of definite value as an adjunct in the treatment of schizophrenic children, although by its action, the drugs do not alter the schizophrenic process, they can eliminate or reduce to a great extent the intensity of emotional tension and anxiety which makes the patient more amenable to other types of therapy, including psychotherapy. The tranquilizing action of these drugs in the group of other functional-and-personality disorders produced positive changes in behavior patterns. The use of any form of physical restraints has been eliminated completely as well as sedatives; there is no need or indication for electric shock at the present time.

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SEASONAL VARIATION IN MILITARY NEUROPSYCHIATRIC ADMISSIONS

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In the course of a study of admissions and dispositions throughout one year on a military psychiatric service, an interesting phenomenon has been noted and is presented in advance of major conclusions to be derived from the broader inquiry. Admissions from Sampson Air Force Base (Western New York) personnel to the psychiatric service of the local hospital appear to show a definite correlation with season. Admissions were lowest in August at a rate of 0.29 per thousand and highest in February at a rate of 3.13 per thousand, and between these extremes fell along a fairly smooth curve. Within all psychiatric diagnoses, correlations are being studied between specific illness and other factors, including age, race, length of service, formal education, past history and available indices of military performance. In general these factors seem to be evenly spread across a year's turnover of personnel at this base so as not to contribute unevenly to a peaking of psychiatric admissions in midwinter.

Total neuropsychiatric admissions have been divided into three subgroup curves specifically psychoses, neurotic disorders, and the character and behavior disorders. In the division of the total into these three categories, the specific number for certain months becomes low enough to make difficult a claim for high statistical validity. However, the generally bell-shaped quality of the subcurves suggests validity, and it appears that a great enough number of cases would definitely establish statistical significance. The psychoses were numerically least in this study and are presented in a dicrotic curve. This dicrotic quality is probably artifact. More significant apparently is that a median projected time for psychosis admissions would coincide very closely with a median time for admission of neurotic disorders, the date for each occurring in January. On the other hand, a similar projection of median admission time for the character and behavior disorders is seen to fall a full two months later, peaking in March. In each case the indication of the first of the month subsumes admissions throughout the month. Thus, the plotted curves imply that those psychiatric disorders involving primarily autoplastic mechanisms become manifest earlier in the winter cycle than do those disorders involving largely alloplastic symptomatology.

There is a marked discrepancy between the admission rate of trainees and that of base permanent party. The permanent party personnel is made up of 15 to 20 per cent of officers and 85 to 80 per cent of enlisted men of varying service spans all of whom have been proven to some extent through successful duty performance. It would be expected that the raw unselected groups of incoming trainees would show higher incidence of psychiatric disorder throughout the year, as is indeed the case. They also manifest a much increased admission rate in midwinter. Even in comparing these dissimilar groups, however, the proven and the unproven, it is to be noted that the larger movement of the permanent party psychiatric admission curve coincides generally with the trainee peak, but is representative of so few cases as to discourage claims for statistical validity.

Table 1 gives data by month on base strength and its division into trainee and permanent party categories, data of admissions to the base hospital with psychiatric diagnoses similarly subdivided, and finally an expression of rate of admission per thousand for both trainees and permanent party.

Table 2 gives a monthly ratio of total neuropsychiatric admissions per thousand troops of total base strength, followed by breakdown into ratios for psychotic disorders, neurotic disorders, and the character and behavior disorders.

Figure 1 shows a plot against month of base strength in thousands, rate per thousand of total base strength of total neuropsychiatric admissions, rate per thousand of total base strength of admissions for psychosis, neurosis and character disorder.

Figure 2 shows a plot against month of

TABLE 1.—Components of Base Strength and Neuropsychiatric Admissions

Month	Total Base Strength	Trainee Strength	PP Strength		NP Admissions			Rate of Trainee Admission	Rate of PP Admission
			Officers	EM	Total	Trainee	PP		
1953									
July	10,473	4,193	684	5,596	5	5	0	1.19	0.0
Aug.	10,405	4,252	711	5,442	3	2	1	.470	.162
Sept.	10,661	4,733	784	5,144	4	2	2	.443	.337
Oct.	11,633	5,661	933	5,039	6	3	3	.528	.502
Nov.	14,238	8,236	1,021	4,981	18	17	1	2.06	.166
Dec.	15,408	9,355	1,019	5,034	29	28	1	2.99	.165
1954									
Jan.	15,108	9,180	983	4,945	40	36	4	3.91	.670
Feb.	15,997	10,042	930	5,025	50	46	4	4.60	.671
Mar.	18,676	12,648	931	5,097	46	41	5	3.23	.829
Apr.	18,534	12,485	957	5,092	25	21	4	1.68	.661
May	16,703	10,752	822	5,129	19	16	3	1.48	.504
June	17,037	11,023	855	5,159	16	15	1	1.36	.166
July	20,614	14,422	813	5,379	8	8	0	.556	0.0

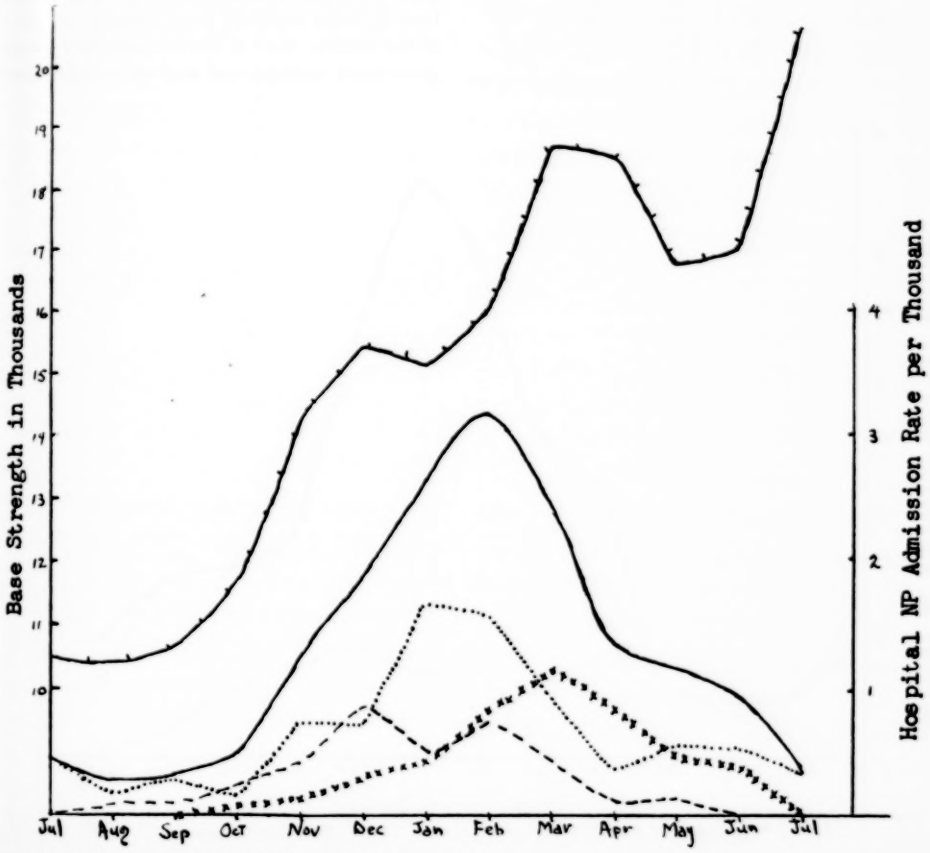

Fig. 1. Neuropsychiatric admissions and base strength.

Base Strength
Total NP Admissions
Psychotic Disorders
Neurotic Disorders
Character and Behavior Disorders

TABLE 2.—DIAGNOSTIC DISTRIBUTION OF NEUROPSYCHIATRIC ADMISSIONS

	Total NP Admission Per Thousand Total Base Strength	Admission Rate Psychotic Disorders	Admission Rate Neurotic Disorders	Admission Rate Character and Behavior Disorders
1953				
July	.48	0.0	.48	0.0
Aug.	.29	.1	.19	0.0
Sept.	.37	.1	.28	0.0
Oct.	.51	.26	.17	.09
Nov.	1.27	.42	.71	.14
Dec.	1.88	.84	.71	.32
1954				
Jan.	2.65	.53	1.65	.46
Feb.	3.13	.75	1.56	.81
Mar.	2.46	.43	.91	1.12
Apr.	1.35	.11	.38	.86
May	1.14	.12	.54	.48
June	.94	0.0	.53	.41
July	.34	0.0	.34	0.0

comparative neuropsychiatric admission rate per thousand for all causes of trainees and of permanent party.

The obvious first questions in regard to these findings must be aimed at identifying the variables. Of those possible, certainly the most complex is the human substrate from whom admissions occur. The other immediate and simpler variable is the environment, of which the chief component appears to be seasonal variation. The human variable is largely self-cancelling in view of the turnover rate of this basic training base. On this base during the study period, permanent party personnel were a fairly stable group, gaining or losing individuals at a low and uniform rate. Trainees, however, were brought to this base in large numbers from roughly all parts of the eastern third of the United States, were given basic training and sent on to other duty

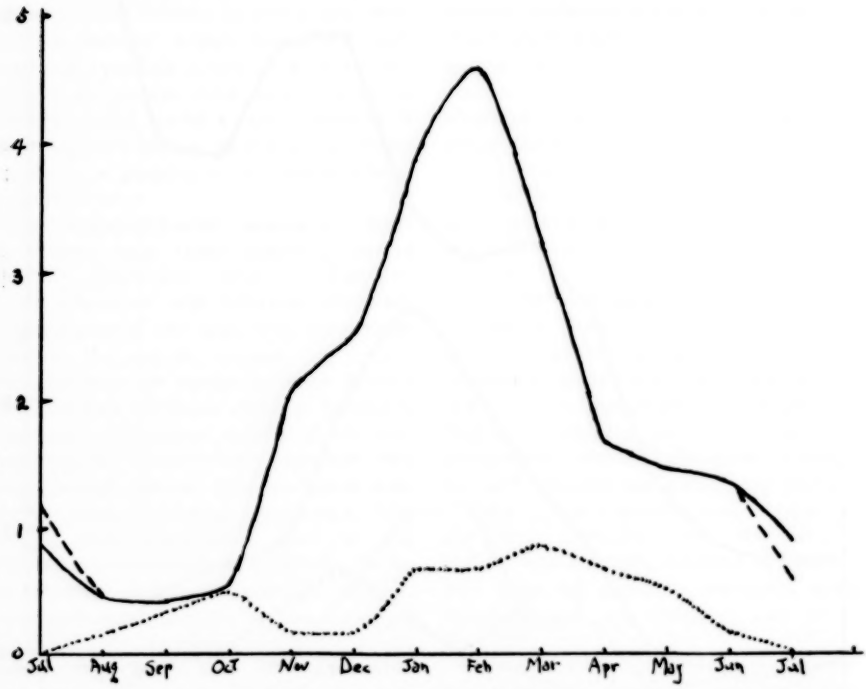

FIG. 2. Comparative neuropsychiatric admission rates per thousand.

Trainees ———— Permanent Party .....

July figures for 1953 and 1954 averaged. Dotted line indicates single year figure.

assignments or technical schools. They arrived at a rate of many each day and went into formal training as soon as they were assembled into flights of 72 trainees. Training in total elapsed time ran from 75 to 90 days. Different flights might be as close as a day or two apart in their prescribed schedules. Thus, many thousands of different individuals in a rapid turnover training system have participated in furnishing the admissions under study. In general, these trainee groups have been of fairly high homogeneity as to age, race, education and other measurable factors. However, the winter groups have furnished neuropsychiatric hospital admissions at a rate ten times the extreme low summer rate. Also, within the entire base strength there appears to be a definite movement of psychiatric admission with season.

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CARDIAC CONDITIONAL REFLEXES CAN BE FORMED TO PAIN BUT NOT TO ACETYLCHOLINE[1]

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There is ample experimental evidence that the conditional reflex (CR) is primarily a cortical process. Studies with drugs that act either on the central nervous system or on peripheral end-organs have contributed to the clarification of this problem. Collins and Tatum (3), Kleitman and Crisler (21), Mulinos and Lieb (31), and Crisler (4) were able to condition the secretion of saliva caused by morphine, a drug acting on the central nervous system. Conversely, Kleitman (20), Mulinos and Lieb (31), and Finch (6) found that salivation caused by pilocarpine, a drug acting peripherally on the gland itself, could not be conditioned.

There have been other investigations of this problem. Finch (7) reported in atropinized dogs that a CR did not develop with food as the unconditional stimulus (US), but one did develop with dilute HCl. Wikler (41) observed salivary conditioning to atropine injections and interpreted it as "conditioning of an adaptive response to drying of the mouth produced by the direct effects of the drug on the salivary gland." MacKenzie and Gantt (27) failed to condition the cardiac acceleration due to atropine. They explain this on the grounds that atropine acts directly on the heart, and not through the central nervous system. Gantt, Katzenelbogen and Loucks (13) found that hyperglycemia to adrenalin could not be conditioned, and Katzenelbogen, Loucks and Gantt (18) failed to condition gastric secretion caused by histamin.

Contrary to the negative findings with adrenalin referred to above, Zubkov and Zilov (43) report the conditioning of the cardiac reaction to adrenalin. Bykov (2) refers to Delov's (5) work, in which the cardiac reaction to morphine was conditioned, and to Petrova's (35) work, in which the cardiac reaction to nitroglycerine was conditioned. Also Samarin (36) reported the conditioning of the cardiac reaction to intravenous acetylcholine or adrenalin, using the sound of a trumpet as the CS.

The action of acetylcholine in causing cardiac inhibition followed by acceleration has been shown by various investigators, such as Goldenberg and Rothberger (14), and Noth, Essex and Barnes (32). That both the inhibition as well as the acceleration are due at least in part to the peripheral action of this drug has been established by Hoffman *et al.* (17), Heymans and Bennati (16), and McDowell (30). The inhibition has been shown by Hoffman *et al.* (17) to be due to the direct effect of acetylcholine on the heart muscle, for it is blocked by atropine, while the acceleration is considered to be due to action of acetylcholine on cardiac ganglionic synapses, or to the secondary release of adrenalin. Hoffman *et al.* (17) were able to abolish the cardiac acceleration by means of ergotamine, curare and nicotine. Heymans and Bennati (16) blocked the acceleration with "tetra-ethyl-ammonium". While the inhibition and acceleration can occur independently of the central nervous system, Greenberg and Lambeth (15) have shown that acetylcholine causes a vaso-depressor effect and cardiac acceleration. This acceleration is abolished by cardiac denervation, showing its reflex nature. However, there is also a delayed tachycardia due to the release of adrenalin that is greater after cardiac denervation. Thus the acceleration is partly reflex in nature and partly due to direct effect on the heart.

Method. The technique for the intravenous injection of drugs from a distance into dogs isolated in a sound-proof camera, described by Teitelbaum and Gantt (39), was employed with some modifications. It was found that the drug, when injected, would at times back up into the saline system because of the great resistance resulting from the very small caliber of the plastic tubing in the vein.

[1] Pavlovian Laboratory, Phipps Psychiatric Clinic, Johns Hopkins Medical School. Aided by a grant from The American Heart Association.

It was therefore found necessary to discontinue the use of saline. By working rapidly, the drug reservoir could be connected directly to the needle in the plastic tubing in the vein. If any blood does get into the plastic tubing while making this connection, an injection of oil from outside the camera clears the blood by displacing it with a small amount of drug solution. This method worked very well. Blood would rarely get into the plastic tubing except in case of a leak in the system, or due to the failure to close the stopcock on the injection system, outside the camera. In the latter instance, the plunger of the syringe is pushed back by the blood pressure through the medium of the drug solution and the oil.

The conditioning technique involved the restraining of a previously trained dog in the camera as illustrated by Teitelbaum and Gantt (39). The unconditional stimulus (US) consisted of the injection of 0.4 cc. of 1 per cent acetylcholine chloride (ACh). This was accompanied by a conditional stimulus (CS) (the ringing of a bell, or the sounding of a tone of 520 pitch for 15 to 20 seconds) so that the CS began before the unconditional reaction (UR) to the drug occurred and overlapped with this UR. Thus the CS preceded and overlapped the UR. The amount of overlapping varied as the cardiac reaction to the drug did not always have the same latent period to the time of injection from outside the camera. Because this latent period varied, the duration of the CS was changed from time to time to assure overlapping with the UR. The CS thus varied between 15 and 25 seconds. The CS was often started at the time of injection of oil from outside the camera. If the latent period for the UR was prolonged, the CS was started 5 or 10 seconds after the injection, so as to have the desired overlapping with the onset of the UR, without having too long a CS. Starting the CS after the injection of oil from outside the camera is not a reversal of the usual sequence in CR studies, for the actual injection of oil is not experienced by the dog. Thus the usual exteroceptive US has been eliminated, and the UR is the process that is preceded by and overlapped by the CS.

Three dogs were studied, Sassafras, Ribs and Iran. The first two were given 200 repetitions of the CS, reinforced by the unconditional cardiac reaction, UR, to injections of acetylcholine. A tone of 520 pitch (T520) and a ringing bell, respectively, were the CS in these two dogs. The third dog, Iran, received 57 reinforced CS (ringing bell). In each instance, before the conditioning experiments were initiated, the reaction of the heart to the CS alone, namely the cardiac component of the orienting reflex, was extinguished by repeatedly exposing the animal to the CS for intervals of 20 seconds duration until there was no cardiac reaction.

Results. Sassafras. The conditioning experiments consisted of 200 reinforcements of the CS, a tone (T520), by the unconditional reaction (UR) of the heart to acetylcholine. Every one of the injections produced cardiac acceleration. In 159 instances, inhibition preceded the acceleration. This reaction is illustrated in figure 1, Tone and ACh.

Cardiac acceleration. In figure 1, the graph of the average of the cardiac reactions (UR) to 10 successive injections of acetylcholine (US) shows inhibition from 86 per min. to 69 per min., that is, followed by a marked rise of the heart rate to 179 per min. That same day, two instances of CS without reinforcement by the US showed no significant change in heart rate after 198 and 200 reinforcements, respectively.

That the unreinforced CS gave no significant

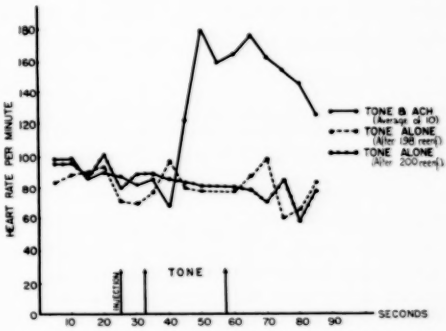

FIG. 1. Dog 1, Sassafras. Graph showing failure of cardiac reaction to ACh to condition. Solid line shows the average of the respective cardiac reactions (UR) to 10 I.V. injections of ACh, each given in reinforcement of a tone (CS). Broken line – – –, and dotted-solid line –·–·–, show the absence of significant cardiac reactions to unreinforced tones (CS), after 198 and 200 reinforcements, respectively.

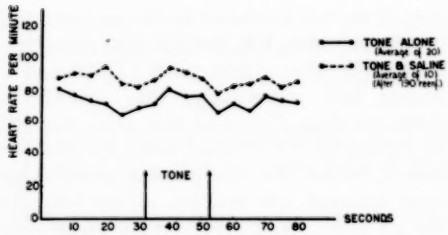

FIG. 2. Dog 1, Sassafras. Graph showing absence of any cardiac reaction to tone (CS) plus saline injections. Broken line - - - - shows failure of significant cardiac reaction to unreenforced CS, as average of the 20 instances of CS given without reenforcement. Solid line ——— shows failure of cardiac reaction to saline (substituted for ACh) reinforcement of the CS, after 190 reenforcements of the UR, as average of 10 trials recorded in table 2. Injections given approximately 10 seconds before tone was started.

acceleration in heart rate at any time during the experiment is shown in figure 2. The solid line represents the average of the cardiac reactions to 20 different unreenforced CS given successively after the following respective numbers of reenforcements by the UR—8, 20, 33, 42, 51, 59, 65, 74, 86, 95, 101, 111, 120, 139, 152, 162, 172, 181, 198 and 200. In the responses to the 20 reenforced CS, the heart rate during the CS was slower than or equal to that of the control rate during the 10 seconds preceding the CS.

To control the above findings, between the 190th and 191st reinforcement, the acetylcholine was replaced by saline and the usual procedure was carried out. Table 1, giving the reactions of the heart to the individual saline reenforced CS, shows no significant change in rate. The graph in figure 2, of the average of the cardiac reaction to 10 reinforcements of the CS by saline instead of drug, illustrates this lack of change. Here, in only one instance, no. 7, did the heart rate during the CS exceed the rates during 30 seconds preceding the CS, and that by nine beats. In the other nine instances the rates during the CS were well within the normal variation, as indicated by the undulating nature of the graph in figure 2.

Cardiac inhibition. Because the cardiac inhibition was of such short duration, it is recorded as the longest time interval of cardiac arrest, i.e., as the longest time interval between successive beats. The longest interval between beats, during the 20 instances of unreinforced CS referred to above, varied between 1–1.7 sec. This is no greater than the longest intervals of 0.5–2 sec., occurring in the control records preceding the 200 injections of ACh. In contrast the longest period of cardiac arrest following acetylcholine injection ranged from 2 sec. to 5.2 sec., in 159 of 200 injections, showing inhibition in 80 per cent of the injections. However, with the unreinforced CS, and with the saline reinforced CS, there was no evidence of cardiac inhibition.

Cardiac conditioning to pain. Since this dog failed to show cardiac conditioning to a tone reinforced by the cardiac reaction to acetylcholine, its potentiality to develop a cardiac CR was checked by reinforcing the tone by

TABLE 1

Dog 1, Sassafras. Heart rate per minute for successive 5-second intervals shows absence of significant cardiac reaction to saline solution, injected instead of ACh as Unconditional Stimulus. There is no cardiac reaction to the saline Reenforced Tone (CS), after 190 reinforcements of the CS by the UR of the heart to ACh.

	Control, Before Tone						Reinforced Tone (CS)				After Tone					
1	82	80	64	65	67	72	68	64	71	76	64	62	58	72	80	67
2	72	86	72	88	72	71	64	71	83	78	72	68	72	68	67	74
3	61	77	68	62	54	60	72	78	70	78	71	62	71	73	64	73
4	95	68	66	61	54	60	64	74	68	72	59	65	64	68	67	67
5	72	60	65	76	56	61	76	70	66	54	58	56	65	66	60	67
6	86	77	71	72	73	70	65	88	73	85	48	65	71	83	94	84
7	85	65	72	66	72	83	88	84	94	73	77	65	73	84	76	68
8	90	102	91	82	62	82	70	91	76	71	76	76	70	85	80	90
9	92	74	73	70	73	73	74	95	83	90	72	126	60	96	82	76
10	72	82	96	71	74	62	73	85	83	94	68	71	71	71	73	72
Average.....	80	77	73	71	65	69	71	80	76	77	66	71	67	76	74	73

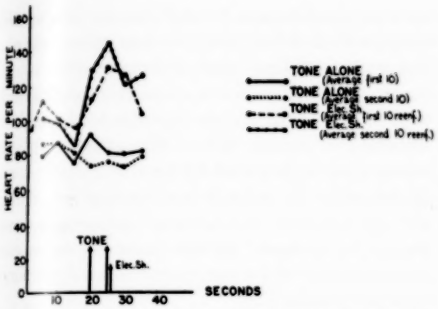

FIG. 3. Dog 1, Sassafras. Graph showing positive motor cardiac conditioning to electric shock. Solid line ——— shows the absence of any cardiac orienting reaction (OR) as the average response to the first 10 unreenforced CS. Line xxxx shows the same as solid line, as the average response to the second 10 unreenforced CS. Broken line – – – – and dotted-solid line ·—·—· show the increase in heart rate to the tone (CS) on reinforcement by electric shock (US) to the forelimb. Within less than 10 reenforcements the heart rate shows acceleration during the CS, before the electric shock (US) is applied. Each curve shows, respectively, the averages of 10 successive heart records.

an electric shock (US) to the left fore-leg, with resultant withdrawal, unconditional reflex, (UR) of the leg, as described by Gantt (11).

Motor conditioning (withdrawal of leg to shock) was tried as a control to determine whether the heart rate in this particular dog could be conditioned to other unconditional cardiac accelerators. The motor CR (movement of leg) appeared after the fourth reinforcement of the CS. Cardiac conditioning occurred within the first 10 reinforcements, and was more marked in the second 10 reinforcements, as illustrated in figure 3. Thus the failure to establish a cardiac CR to acetylcholine could not be ascribed to any idiosyncrasy of this particular animal. Actually the cardiac acceleration to electric shock was hardly as great as that to acetylcholine, indicating that the degree of cardiac reaction is not the significant factor in the ability to condition.

The other two dogs failed to develop cardiac conditional reflexes after 200 and 57 reinforcements of a CS by means of the unconditional reaction of the heart to acetylcholine. In contrast both dogs promptly developed cardiac conditional reflexes to painful electric shocks as the US, as in the instance of the first dog described above.

DISCUSSION

In the light of the failure of cardiac inhibition and acceleration caused by acetylcholine to condition, several studies on the effect of acetylcholine on conditional reflexes are of interest. Freile and Gantt (8) reported that acetylcholine in some dogs improves the differentiation between the excitatory and inhibitory processes. Adrenalin was found in other types to impair motor, salivary and cardiac conditional reflexes. Acetylcholine improved the performance in the neurotic dog even more than in the normal dog. Funderburk and Case (9) observed that eserine and prostigmine inhibited conditional reflexes. These authors state that the action of eserine is "presumably due to the increase of ACh in the brain." The action of prostigmine is explained on the basis of discomfort due to increased intestinal activity.

It is quite impossible to compare the response to repeated small intravenous doses of ACh, which have transitory effects lasting about 1 to 2 minutes, with the reaction to eserine that lasts for hours. The eserine injected animals showed reactions not observed in our animals, such as "confusion", "defense reactions such as fighting", "fright", and "hallucinations of being shocked". Our dogs showed no disturbing reactions to the injections of acetylcholine, usually sitting very quietly, with no observable movements during the cardiac response to the ACh. The animals were active at times, but this activity appeared to have no specific relationship to the drug. In the light of Freile and Gantt's (8) observations with ACh, and the above remarks about the effects of eserine, the failure to develop cardiac conditioning in our experiments is not attributable to any inhibiting action of ACh on the cerebral cortex.

The CR is a central nervous system process, not merely in a physiological sense, but also in an emotional sense. A disturbed emotional state, as occurs during hunger or pain, plays an important role in conditioning according to Gantt (10). In our experimental data the essential nature of pain in cardiac conditioning is evident. Gantt (12) demonstrated that hunger is a requisite for salivary conditioning with food. Also Gantt, Katzenelbogen and Loucks (13) reported that hyperglycemia

caused by administered adrenalin could not be conditioned. They explain this on the grounds that the adrenalin acts directly on body tissues, rather than through the central nervous system. Certain effects of adrenalin, as muscular movements, retching and salivation, did condition. These were considered as signs of a disturbed emotional state involving the central nervous system. Gantt *et al.* postulated that hyperglycemia associated with fear could be conditioned, but not that due to injected adrenalin.

Loucks and Gantt (26) arrived at conclusions, similar to the above, by another method. They conditioned the motor reaction to direct stimulation of the dorsal roots and dorsal column of the spinal cord, and arrived at the formulation that "An unconditional stimulus which leads to reflex movement without exerting nociceptive neurons, or others of a similar category, seemingly constitutes an inadequate basis for establishing a conditional avoiding movement." Masserman (29) failed to condition the effects of direct hypothalamic stimulation. "There is no evidence," he stated, "that peripheral 'pseudoaffective' reactions could be mechanically 'engrammed' by any number of such attempts at direct central conditioning. In these experiments, when the hypothalamus was shown to behave not as an afferent, experience-mediating organ, but as a way station or efferent sympathetic and motor pathway which . . . cannot be conditioned by direct stimulation".

Loucks (24) further confirmed the above. He noted that leg movements caused by direct stimulation of the motor cortex could not be conditioned to the sound of a buzzer. Direct, painful electrical stimulation of the limb produced conditioning to the buzzer after 19 reenforcements. Certain "wincing" movements due to cortical stimulation in Loucks' animals did condition. He assumed these were due to inadvertent sensory cortical stimulation, which accounted for the prompt conditioning of the "blinking". Such sensory stimulation could be considered as giving rise to a disturbed emotional state. Later Loucks (25) added further support to the basic principle being stressed. By giving food after every trial of motor cortical stimulation, namely buzzer-shock-food, the leg movement became conditioned to the buzzer. This CR extinguished when the CS was given alone. Loucks concluded that "the movement of the limb at cortical shocks results in centripetal volleys of proprioceptive impulses to the higher somesthetic nuclei. When this proprioceptive stimulation is followed by food . . . there is an opportunity for a backward association to be set up between the sensory experience and the eating of food." In this instance, we might add, the state of hunger comprises a disturbed emotional state.

The above can be applied to our own findings. In acetylcholine tachycardia, the response is in part a reflex due to the vaso-depressor effect of the drug, as shown by Greenberg and Lambeth (15). This reflex tachycardia is dependent on the feed-back of enteroceptive nerve impulses to the central nervous system. These are comparable to Loucks' "centripetal volleys of proprioceptive impulses". Neither the cardiac vaso-depressor nor Loucks' muscular feed-back impulses are in themselves adequate for CR formation.

Contrary to our findings, the cardiac response to adrenalin, acetylcholine, and other peripherally acting drugs has been conditioned by Bykov (2) and his associates, and by Zubkov and Zilov (43). It may well be that the failure to isolate the animal from the experimenter, the importance of which was shown by Owens and Gantt (34), and the repeated needle punctures contributed enough emotional disturbance to motivate cardiac conditioning.

In addition to the reflex vaso-depressor cardiac acceleration, there is acceleration due to the direct effect of acetylcholine on the heart. This acceleration, as an effector response, is not sufficient in itself for the development of a CR. That effector responses cannot in themselves be conditioned and that conditioning can occur in their absence has been established by a number of investigators in various ways. Crisler (4) prevented morphine salivation by means of atropine and carried out conditioning procedures in the absence of the salivary effector response. A salivary CR nevertheless developed even though no actual salivation had occurred. Also, during extinction experiments of the morphine salivation, pilocarpine was ad-

ministered to continue the salivary flow. The conditional secretion of saliva did extinguish in spite of the presence of the effector response due to pilocarpine.

The non-essential nature of the effector response in conditioning was also demonstrated by Light and Gantt (23). They paralyzed the leg by crushing the anterior spinal roots, and trained for motor CR during the period of paralysis. When recovery of motor activity began to appear, the unreenforced CS elicited a CR. It is thus evident that the execution of the UR is not essential for the formation of a CR. Loucks' (24) failure to condition leg movements resulting from direct stimulation of the motor cortex also indicates that an effector response in itself is not sufficent for conditioning to take place.

Brogden and Gantt (1) have successfully conditioned the motor reaction to direct cerebellar stimulation (intraneural conditioning), which they believed does not require emotional reenforcement. These findings can however, be viewed in a different light from that expressed by the authors at that time. Since cerebellar discharges are transmitted to the cerebral cortex among other places, through the reticular-activing system as shown by Nulsen, Black and Drake (33) and Snyder (37), Brogden and Gantt really stimulated afferent pathways to the cortex in their experiments. This is comparable to Loucks' (24) "wincing movements" which he interpreted as effects of sensory cortical stimulation which was transmitted to the motor cortex. In this sense cerebellar stimulation is essentially different from direct motor cortex stimulation as a US. Since the cerebellum discharges through the brain stem reticular activating system to the cerebral cortex, such a neural integrative pattern could involve emotional motivation without readily discernible evidence of disturbed emotional behavior. This is born out by Magoun (28) who demonstrated that cortical activation can result from auditory stimuli through the activating system even after the ascending auditory pathways in the brain stem are interrupted so that the animal neither hears the sound nor reacts to it specifically. On this basis, cerebellar CR formation can be considered as complying with the formulation expressed in this paper.

The theories supported by our experimental findings, that emotional motivation is important in CR formation, can be extended to learning and behavior in general. This would be in agreement with Whitehorn's (42) concept of the role played by the "acute emotional experience", as well as with the views promulgated by Masserman (29), Liddell (22), Kempf (19), and Teitelbaum (38).

Summary

1. Earlier studies, on the conditioning of end-organ responses to peripherally and centrally acting drugs, and of the mechanisms involved in the effect of acetylcholine on the heart, are reviewed.

2. Attempts were made to condition the cardiac reaction to ACh by means of a technique which permits the painless injection of repeated doses of ACh solution intravenously into trained dogs isolated in a sound-proof camera.

3. In three dogs the cardiac reaction to ACh failed to show evidence of conditioning to a ringing bell or a tone of 520 pitch after 200 reenforcements in two animals, and 57 in the third one.

4. These dogs showed prompt conditioning to a painful US, consisting of an electric shock to the leg.

5. The experimental results are discussed in the light of the role played by emotional motivation in conditioning, as well as the non-essential nature of the effector response to the US, in conditioning.

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AN APPROACH TO ELECTROSHOCK THERAPY WITH THE USE OF ANTICONVULSANTS

DANIEL BLOOM, D.D.S.

Since the introduction of electric shock stimulation as a tool in psychiatric treatment, there have been many refinements in technique due both to the progressing clinical experience of therapists making use of it and actual mechanical improvements in the mechanisms used.

We now are at a point where many different levels are possible because of all gradations of stimulation which may cause patient reaction of mild non-convulsive response to violent convulsive activity, similar if not more intense to naturally occurring grand mal seizures.

In examining the literature pertaining to natural seizures (epilepsy), we find crude research extending back to antiquity (2) up to the time that it was formalized through the heroic works of Hughlings Jackson and then others. From Jackson's time onward up to the original work of Merritt and Putnam in 1938, there was only slow progress in the discovery and use of effective anti-convulsants. Their systematic study of the anti-convulsant activity of a large number of chemical compounds resulted in the clinical use of dilantin at first and then the entrance of other hydantoins. A new age had opened in anti-convulsant therapy—an age in which other compounds have and shall prove their efficacy, making for greater and greater flexibility in control of epileptic seizures for those men assuming this responsibility.

However, in the controlled epileptic there is an interesting by-product, which though it may be discounted in epileptic therapy may be of interest to others mechanically causing convulsions. This is the amnesic equivalent. Since it has been of little importance in anti-convulsive therapy, there is very little formal description of it. Perhaps it may be described as a momentary euphoric period surrounded by communitative isolation due to the fact that it interferes with the ability of speech and of understanding words in their normal meaning. Even though in each person affected it may take on an individual recurrent pattern (much as the regularity of the aura in uncontrolled epileptics), there is a rather total inability by the patient to accurately describe it after it has passed, though there is a sense of having known what it meant during the time of its presence. There is no essential motor disturbance during the period of the amnesic equivalent, and there have been attempts by patients to describe the feelings experienced in pantomime, though to the casual observer these efforts are horribly garbled. An interesting observation has been that the last thing thought or done immediately preceding the equivalent has been the focal point of interest during it. The thought process does not seem to progress during that momentary amnesia.

Now, the question is, what about all this in relation to electroshock therapy (EST)? That question is whether convulsions are necessary to get maximum beneficial results from shock therapy. Is it possible that the convulsions are a barrier blocking the possibility of stimulation with higher millieamperage? Is it possible that the good results reported from convulsive therapy may come *only* from the electrical stimulation to the cortex *per se*, in which instance convulsions would be but a normal physiological reaction but one that might possibly interfere with the efficacy of the desired results?

There is some basis for this theory even within the field of shock therapy itself. There are some men who lean toward non-convulsive therapy when possible. It has been reported (3) that there is a tendency for the non-convulsive treatments to counteract the confusion, the spotty amnesia and the anxiety induced by convulsive electrostimulation. Another point is that it is possible to somewhat correlate the clinical prognosis with the patterns established immediately after non-convulsive stimulation, though there does not seem to be this correlation in post-convulsive behavior (3).

Of course, the beneficial results from non-

convulsive therapy are not as rapid and dramatic as those from actual convulsive therapy. However, if we are to accept the theory that the beneficial results are from the electric current itself, then this is logical since the amperage is smaller in the non-convulsive reaction.

If all this is true, what is the actual meaning of it? The meaning possibly is as in one investigator's words (1) "if all human beings . . . are capable of manifesting convulsive seizures, then the problem of the threshold of release (or convulsive threshold) becomes the important crux of the matter in terms of clinical analysis." If in many instances a person becomes subject to natural convulsions not because of some pathological entity but because of something lowering the convulsive threshold, then those persons subjected to artificial stimulation far above cortical discharge (e.g., EST) can be protected from concomitant convulsions that result by a preliminary raising of their convulsive threshold by a short course of anti-convulsant therapy before starting EST. There is enough clinical evidence on the use of present day anti-convulsants to make one feel quite certain that any side reactions occurring with their use are essentially milder than the problems still potentially present with convulsive activity even with the use of muscle relaxants.

Comment

1. A course of EST with preliminary raising of the convulsive threshold by anti-convulsants has been suggested.

2. There are no known contraindications to this.

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Society Proceedings

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

Meeting of December 16, 1955 with Dr. Erich Lindemann, presiding

STEPS IN THE DEVELOPMENT OF AN OPEN HOSPITAL. T. P. REES, M.D., O.B.E. Superintendent of Upper Warlingham Psychiatric Hospital, Surrey, England. Consultant in Psychiatry to World Health Organization

(An abstract of this paper is not available for publication.)

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

Meeting of January 19, 1956, with Dr. Erich Lindemann, presiding

STUDIES ON THE STABILITY OF INTERACTION PATTERNS IN PSYCHIATRIC INTERVIEWS. GEORGE SASLOW, M.D. AND JOSEPH D. MATARAZZO, PH.D.

Problem: To investigate the stability (reliability) of Patients' interaction patterns in repeat interviews with the same or with a different interviewer.

Subjects Used: Three experiments were done in all. The first was a test-retest study in which 20 psychiatric outpatients were each interviewed in the same afternoon independently by two *different* interviewers. The second study was a test-retest experiment in which 20 other patients were each interviewed twice, one week apart, by the *same* interviewer. The third study was a repetition of the first experiment, using still another group of 20 patients.

Procedure: The method of observation and measurement used was the Chapple interaction chronograph. This instrument, which is activated by an observer on the other side of a one-way screen, permits the continuous measurement (in time units) of such patient and doctor interaction variables as: number of units of interaction, duration of each interaction, frequency of initiative-taking, frequency of interruption, duration of interruption, frequency of dominances and submissions, and several other variables—all obtained during the course of a highly systematized (though free-appearing) and relatively standardized psychiatric interview. The average duration of the interview is 32 minutes.

Results: The interaction patterns in the two interviews of a given patient in the 3 studies were almost identical, with test-retest reliabilities ranging from .72 to .96 for the ten interaction variables studied. Thus invariance of interaction pattern was demonstrated when interview conditions were standardized. Furthermore, there was demonstrated a very striking relationship between the interaction pattern of the interviewer and the pattern elicited from the patient. Thus changeability with planned changes in stimulus conditions (variance of interaction patterns) was also demonstrated.

Conclusions: Raines and Rohrer most recently have confirmed what other investigators have been reporting for years, i.e. the *low reliability* between two psychiatric interviewers when each sees a given patient independently and then makes a rating about the patient's level of anxiety, interpersonal skills, etc. Findings of the three studies discussed above indicate that *high reliability* between interviewers is possible if one standardizes somewhat the stimulus conditions (i.e., the interviewer's behavior) as well as defining the patient characteristics (responses) under study.

Discussion

DR. ERICH LINDEMANN: The discussion of methodology in interview analysis is open for discussion. When I learned my psychiatry in Germany, there was a lot of talk of content analysis in interviews. You were worried that the interviewer was likely to underestimate variations in the formal aspects of the interview. Here a precise type of measurement is being introduced which might be useful in distinguishing minor variations from patient to patient, and from condition to condition. From the material, by implication, is there a high degree of observer reliability?

DR. ALFRED H. STANTON: This research program is a quite interesting one—the authors have documented their point and demonstrated another behavioral regularity quite thoroughly. This means that they have worked out another route for checking the inferences we usually make upon the basis of the content of the interview. The more alternative ways of checking such inferences we have, the more weight we are entitled to give to the inferences.

If, now, we proceed to the question of what the relationship of their observtions are to the contents of the interview—to the patient's reports about himself and his environment as he perceives it, there are two points to be noted. First, this study is in a stronger position than many in that the variables they have treated quantitatively are variables which are pertinent to the type of material of interest to psychotherapists—dominance and submission, for instance,—and they should have less trouble than is often the case in trying to work out the relationship between their observations and clinical considerations. It is nevertheless a very difficult extension of the work, and I think we should be glad that it is on their program.

DR. MATARAZZO: Dr. Jean Phillips has spent a year and a half reviewing the literature of content analysis

and has communicated with people who have wrestled with this problem. It is a difficult problem. She has had to work out a method. In combining several she has a workable tool.

Dr. Jean Phillips: I think using several systems is the answer. Topic (content) will be studied but as related to temporal (interaction behavior) analysis. With dominance and submission as inferred from "content" see if this is related to behavior as measured in a real "dominance-submission" sequence of a standardized interview.

Dr. Matarazzo: We found that some of our patients in the first interview would talk about marital relationships, some about military experience. Even though the content differed, they were apparently the same persons by interaction chronograph measurement.

Neuropsychiatric Aspects of Acute Poliomyelitis. Martin R. Coles, M.D. and Jimmie C. Brockman, M.D.

This study was designed to investigate the delirium occurring with acute poliomyelitis, the psychological impact of an acute, major, and crippling illness, and the possible role of the psychiatrist in this type of medical crisis. One hundred and one adult patients with acute poliomyelitis were studied, of whom 46 were in respirators. Seventeen cases of delirium were observed. This was characterized clinically by a varying level of consciousness, pleasurable hallucinatory experiences, and frequent illusions and delusions. The imaginary experiences were frequently described by the patient as "wakeful dreams." There was waxing and waning of the degree of disorientation and confusion with a shortened attention span. This picture lasted from a few days to several weeks, occurring initially with the febrile phase and in the patients having signs of bulbar involvement. This delirium markedly resembles the peduncular hallucinosis described by L'Hermitte in 1922.

A general study of the psychological response of patients to acute poliomyelitis revealed certain predominant patterns. Denial was seen in the majority of patients and its degree seemed to bear a direct relationship to the severity of their illness. For patients in the respirators, denial was a universal reaction and was responsible for a sense of well-being and confidence at startling variance with the facts. Other mechanisms observed were rationalization, regression, paranoid responses, and aggression. Depression was surprisingly infrequently observed in the acute phase.

Discussion

Dr. Raymond D. Adams: We all appreciate the accuracy of Dr. Brockman's observations on these cases. Knowing a little about the literature, I should say the accurate recording of such cases is worth while. So little is good on delirium in medical writings. I would have said that she had reported that delirium was quite frequent, also unexplained comas and other types of "encephalitis." In this state of delirium and its components, I would include tremulousness, motor restlessness, psychic overactivity, stereotype of psychic reaction, confusion, sleeplessness, sensorial difficulty, and convulsions. I think that represents a unique clinical state. It should be distinguished from a confusional psychosis, where the sensorial component is not predominant. This delirious syndrome does occur in polio, also in quite a number of other conditions, such as drug intoxication, withdrawal states and systemic infections. It must be obvious that it represents some type of brain disease, but no one knows what kind of trouble or where it is situated. All of these we are searching for and case material is worth the most careful analysis. The writing of L'Hermitte has been mentioned. He has done most to advance the idea that visual hallucinatory states could be produced, not by something wrong at the end organ, or cortex, but in the midbrain. If you looked carefully at some of his cases, and examined some of these on the neurological wards, you would be in doubt about whether the pathology is in the midbrain. Something can happen with thalamus, mesencephalic area, creating visual hallucinations in which the patient has insight and reasonable mental clarity. The best material is the vascular case, where a neat lesion can be traced. We have had a few such cases. Pathology of the thalamus and its anatomy is so complicated that it is hard to work out a uniform picture. We have five of the cases that Dr. Brockman has described in our pathological material. I should think it would be worthwhile to go through this material with care, trying to compare these five with the other 19 or 20. The anoxia factor, shock, circulatory and fever get involved so that it is not a simple problem. How many of your patients had tactile and auditory hallucinations? That was mentioned by L'Hermitte in his cases. We have seen auditory illusions and hallucinations with lower brain stem lesions. I suspect some secondary auditory fiber systems are getting involved. L'Hermitte's cases were in a higher part of the brain stem. What Dr. Coles tells us about the psychological reaction is known to all clinicians who have to deal with it. Some of them are scared to death, and families even more so, sometimes unduly. I would not say that all cases that go in a respirator are euphoric. One of our problems is to get them calmed down. Sometimes what he has seen is the result of persuasive management by the house staff. Doctors think patients should be more worried than they are. That is true in tuberculosis, vascular diseases, etc. What this denial is, I do not know. Sometimes it is a lack of appreciation of what they are up against, sometimes a type of psychological defense to keep them from being too much upset by it.

Dr. Joseph M. Foley: Dr. Mendelsohn, a House Officer on the Tufts Medical Service at the Boston City Hospital, and I made independent observations on some patients in the respirator and lately we have been comparing notes. Several features of this psychotic reaction are of interest. Anoxia alone cannot produce it. We had patients who were anoxic for days before going into the respirator who had no such symptoms. The reaction occurred after they had been in the lung for 4 to 7 days, and lasted about 11 to 14 days. Although it is true that the content was not horrendous, neither was it always pleasant. Some of our patients showed a good deal of aggression and resentment.

A very striking feature to us has been the vividness of the patient's memory of these unreal experiences often when there was no memory of the reality situa-

tion. This vividness of memory does not persist after the ordinary dream or after delirium

I would agree with Dr. Adams that this psychotic reaction is different from L'Hermitte's peduncular hallucinosis. Dr. Mendelsohn and I have wondered if it may not be a psychological disorder occurring as a manifestation of sensory deprivation, since in the mechanical respirator there is a relative poverty of movement, an isolation of the head from the body, and a hypnotic similarity of visual and auditory experiences. What we are seeing may be a modification of Hebb's experiments in sensory deprivation.

DR. ROBERT ARNOT: What if you put a non-polio patient in a respiratory? The body is pleasantly warm, and there is a motor running. So many of these polio patients thought they were in a motor boat or automobile. If you put a normal person in a respiratory for a period of time, wouldn't they take a trip in that semi-conscious state? They would be lying there twenty-four hours. They would be drifting off to sleep at times.

DR. BROCKMAN: We did not feel we saw any frank auditory hallucinations. Auditory illusions were frequent apparently the result of misinterpreting noises of the environment. We did wonder whether the motor of the respirator was responsible for the motor trips. I agree with Dr. Adams that the etiology is something we can only surmise. We did see these patients daily, for about six weeks, at times when they seemed clear, and at other times when they were disoriented. We were impressed by the vivid recollection they had. As they began to recover they had some concern about what this meant. Did this mean that they were temporarily losing their minds? We re-assured them that this had been a delirium and that they need not worry about recovery from it. Is the sensory input actually reduced? We considered Hebb's work and it was our feeling that sensory input is not reduced since they have a lot of pain and discomfort, though paralyzed. We think denial is a valuable mechanism to help make an intolerable situation more bearable.

A PSYCHIATRIC STUDY OF ATTEMPTED SUICIDE AS SEEN IN A GENERAL HOSPITAL. PETER E. SIFNEOS, M.D.

The paper deals with the cases of 155 patients who attempted suicide and were admitted to the Massachusetts General Hospital over a period of 9 years.

The findings on the patients fit roughly into the general patterns described in the literature on suicide.

Barbiturate was ingested more often than any other poison.

The commonest reasons for suicide, as given by the patients, and their relatives, were hostility, loss of loved one, environmental manipulation and reaction to "incurable illness."

In the psychotic patients no clear reasons for suicide were elicited. Their actions seemed impulsive.

In the melange of reasons that were given for the suicidal attempts, 2 major classifications did seem to stand out: *Painful emotional state* of being, and *reactions*. In response to environmental conditions, human beings develop painful emotional states. Their unsuccessful reactions (defense mechanisms) progressively intensify their painful emotions, and isolate them from their environment. Suicide finally appears the only reaction that seems possible. The patients then attempt suicide.

The word "*autoktonism*" is proposed to describe a recognizable state of mind in patients about to kill themselves.

The above pattern is demonstrated specifically in neurotic and psychotic patients, and some ways to prevent suicide are discussed.

THE CRITICAL AGES FOR MATERNAL BEREAVEMENT IN PSYCHONEUROSES. HERBERT BARRY, JR., M.D.

In a retrospective study of a thousand psychoneurotic patients, deaths of parents during childhood followed a pattern which was different from that of the general population. Death of the mother before the age of five was more frequent in neurotics: this is reliable at the .01 level of confidence. Little girls are more adversely affected than boys, the most vulnerable ages being the first three years. This finding is reliable at the .05 level of confidence.

Comparisons with the general population suggest that death of the mother may also be related to neuroses in men. Seven per cent of the females and 4% of the males experienced maternal bereavement during childhood. The vulnerable period extends from birth to eight years of age.

If other types of separation from parents are included 12% of the females and 7% of the males were deprived of their mothers at some time during childhood. These findings are similar to previous studies indicating that death of the mother is associated with psychosis or delinquency, and that girls are more influenced by parental loss than boys.

Death of the father follows a different pattern. The distribution of paternal deaths for neurotics is more like that for the total population. The term "broken homes" is, therefore, no longer adequate in psychiatry.

Discussion

DR. LEO ALEXANDER: I am very much impressed with Dr. Barry's original and informative study. In our science where we deal with so many unsharply defined variables, his ability to quantitate his findings is of great scientific and practical importance. This may also be of importance in medico-legal situations and I, for one, hope to derive help from Dr. Barry's study. The new German Government has taken the very straight-forward and very responsible step to assume responsibility for the acts of the former Nazi Government and has asked me to give expert testimony in the case of a young man who had been exposed to hardships engendered by the defunct Nazi Government at an early age, on whether or not these hardships precipitated schizophrenia in this young man. Dr. Barry's study and similar studies in the future will greatly aid the evaluation of such questions.

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

Meeting of February 16, 1956, with Dr. Wilfred Bloomberg, President, presiding

THE PRE-DEPRESSED PERSONALITY. ROBERT ARNOT, M.D.

"Depressed are the peace-makers" would be a proper subtitle for this paper which describes the type of personality that gets depressed. Whether the final diagnosis is psychoneurosis, manic-depressive, or reactive, the pre-depressed personality may be similar. These people want peace at all costs. They fail to settle issues when they arise. They hold in resentments and let them accumulate. They try to be friends with everyone and are highly concerned with what others think of them. They are overly-conscientious and perfectionistic. These traits lead them to drive themselves to a state of tension and then fatigue and depression. Their peace-making then is an evidence that a neurosis precedes and participates in the depression.

This type of personality rests on a psychological-physiological disturbance. The desire for peace is an expression of a physiologic make-up that does not tolerate well unpleasant stimuli such as loud noises. A state of tension exists that is aggravated by many stimuli of which disturbances in interpersonal relationships are one kind.

Theoretically a too sustained cortical-diencephalic relationship produces the neurophysiologic state. The cortex drives on the diencephalon and vice versa. Finally a state of diencephalic exhaustion is produced. In the earliest phases psychotherapy will break-up this cortical driving. Later electric shock may be necessary.

Discussion

DR. PAUL I. YAKOVLEV: Dr. Arnot's portrayal of the 'predepressed' personality is based on thoughtful observations and as a description it is excellent; these are real people whom one knows among patients, acquaintances, and friends. Does he think, however, that a person with this particular make-up is predictably bound to have a 'clinical' depression? I doubt it. A tendency to gravitate to certain occupations is an interesting side-line. Dr. Arnot mentioned druggists as often being of the type he referred to as 'peace-makers.' I would cite carpenters. As I recall those whom I have known, the image of a carpenter to me (at least when dealt with in his own occupational framework) is that of a peaceful, reserved, patient and judicious person. Is it because Joseph of Nazareth was a carpenter?—I couldn't say. But be this as it may, the anatomical physiological interpretations of the 'predepressed' personality raises many difficulties of which Dr. Arnot himself is clearly aware. The attempts to translate the empirical generalization based after all on subjective experience into the language of anatomy and physiology is always a formidable undertaking. Such attempts are certainly worthwhile for their own sake; it is a stimulating and useful intellectual exercise. Yet one cannot help but be perplexed by the abysmal gap between say 'peace-maker' type of personality and a depressive state of mind and the circuits of electrical potential change in the brain. Dr. Arnot was kind enough to mention some of the speculative notions which we have exchanged with him in conversation. Indeed, the concept of Jacksonian 'latitudinal' levels of functions superimposed 'from below up' has been and remains a most useful working hypothesis for ordering physiological and anatomical facts so long as one remains within the framework of Cartesian causality and logic. However this concept ceases to be useful as soon as one considers the higher functions than those attributed to the midbrain level. Sir Charles Sherrington explored the functions of the spinal cord and medulla oblongata but threw in the sponge, as it were, when he attempted to reach beyond the midbrain. Ivan Petrovitch Pavlov, a notably irascible man, started from the opposite end—from above, but somehow never reached below the cortex; and we still argue, is the conditioned reflex more profitably understood as a Cartesian physiological or as an Aristotelian teleological phenomenon? In a perhaps naive hope of finding a generalized theoretical framework which would permit to define and translate the structure and function of the brain in terms of *needs* of living, I have proposed a few years ago the concept of 'longitudinal' levels of organization of functions 'from within out': from innermost universal, yet intimately *private* visceral sphere, to species-specific intermediate and *not-so-private* expressive-emotional sphere, and finally to highly individual, outermost and so inherently *public* effective transactional sphere of the experience of living. There is abundant evidence that the brain itself developed and is built that way—'from within out.' This concept of logitudinal levels, if it be sound and empirically structured, as I think it is, may perhaps be more suitable for statement in the anatomical and physiological terms what in essence are empirical data even though they usually are of a high degree of abstraction. I appreciate Dr. Arnot's attempt to apply these notions to his interpretation of these data.

DR. HAROLD W. WILLIAMS: This is a discernible type, separate from other depressions. From the point of view of complaints, these people do not say they are depressed. They complain at length about uncomfortable feelings experienced in the soma which convey to them the idea of a physical illness.

OXIDATIVE AND PROTEOLYTIC ENZYME ACTIVITIES IN HUMAN BRAIN TUMORS. NORMAN ALLEN, M.D. AND ALFRED POPE, M.D.

The activities of three enzymes have been measured in a series of fifteen human brain tumors using the quantitative histochemical techniques of Linderstrøm-Lang. With this method histological control of the analyses have been accurate and it has been possible to select viable pure samples of tumor types for study. Cytochrome oxidase activities are generally low in all tumors as compared to human cortex but are of approximately the order of human white matter. There is a specific difference, however, among types of gliomas.

Astrocytomas are very low whereas glioblastoma multiforme is approximately twice as high. Tumors containing oligodendroglia are also higher than astrocytomas. These data correlate well with previous oxygen uptake studies done by other workers. Dehydropeptidase I activity is present in the glioma group in a slightly higher level than that of either cortex or white matter. It is somewhat lower in the benign intracranial tumors. 1-alanyl glycine dipeptidase is present in gliomas also in a slightly higher level than in either cortex or white matter. The presence of these latter two enzymes is taken to reflect a high protein turnover in brain tumors.

Discussion

DR. POPE: May I add a footnote to Dr. Allen's presentation by considering briefly our interest in proteolytic enzymes in glial tumors.

Very little is known about mechanisms for protein synthesis in brain but, like other tissues, it does contain a group of enzymes capable of catalyzing the hydrolysis of various specific peptide substrates. Homologous peptidases of the alimentary tract can, in some instances, also catalyze transpeptidation reactions and, under certain special equilibrium conditions, the formation of peptide linkages as well. It seems likely that the intracellular proteolytic enzymes of brain have some role in the constant turnover of protein that apparently accompanies both the discharge and the trophic function of neurones. At any rate, the activities of tissue proteolytic enzymes have been rather generally regarded as indicative of rates of protein turnover in many other tissues and, in general, peptidases show increased activity with neoplasia.

The neurohistological localization of proteolytic enzymes is largely unknown. We have made considerable study of the quantitative histochemistry of the 1-alanylglycinease discussed by Dr. Allen in a number of regions of the rat and human nervous systems. The results, particularly those upon its intralaminar distribution in cerebral cortex, indicate that this enzyme resides in the cell bodies of both neurones and neuroglia, and probably reflects the amount of actively metabolizing cytoplasmic mass. It is likely that the latter is true of the tumors also, since although the dipeptidase activity in terms of total or of fat free solids is about the same in the gliomas as in normal white or gray matter, it is lower if expressed in terms of cell counts, particularly in the glioblastoma multiforme. Thus the comparative dipeptidase activity of the gliomas does not seem to parallel their growth potential. However, it is difficult to assess the biological significance of such findings in glial tumors because of current ignorance concerning the metabolic and biochemical properties of normal neuroglia.

DR. RAYMOND D. ADAMS: I think this type of presentation can only excite our admiration. It is a fine start in a difficult problem. The material was clearly present, but its significance might be clearer as was pointed out. What we know about brain tumors is clinical diagnosis and histological classification. I doubt if we have anything like a reasonable theory about their cause, and those of us who work with them from day to day are all too aware of the lack of satisfactory methods for treating them. Our neurosurgical colleagues struggle with them and accomplish a little at times. The majority of cases do not lend themselves very satisfactorily to a surgical approach—not from the point of view of any long term or curative results.

It is evident from microscopic sections that the older theory that these tumors are derived from some embryonal cell or anaplastic element residing in the nervous system is probably fallacious. If the very interesting work done by Dr. Alexander and others on experimental tumors has taught anything, it is that under the proper chemical stimulus a normal glial element can be induced to neoplasia. In the brains of some patients with gliomas, you can find isolated tumor cells, as if some chemical influence had acted upon an occasional cell, one or two, here and there, inducing in them a neoplastic change. The most reasonable speculation is that there is some alteration in the metabolism of the cell. No one seems to have any idea of what that is.

The microchemical approach is certainly a worth while one. I suppose Drs. Allen and Pope would agree that they have hardly scratched the surface. I get uneasy in seeing them struggle with the histological methods of classification. In the neurocytoma the cells had processes and something that looked like neurofibrillae but absent Nissl bodies. Everyone of these criteria may be open to question. That tumor may have been a true glioma thus bringing the biochemical data into line with the others. The same is true of other tumors—differentiation of astrocytomas from oligodendrogliomas being far from reliable. In a single tumor you may find different cell types. You are trying to make a biochemical assay of something impure from the histological point of view, but the best thing is to continue the work and not stop at this point just because the first results do not seem to have revealed anything extremely exciting. I think you may come upon a few tumors where you can find a sample that is pure. I would wonder whether it would be worth while to look for other biological criteria with which to correlate biochemical data, such as total nuclear mass or total nucleoprotein content, or even mitotic activity. It would be of interest to use other histological criteria than simply the type of cell. I would feel that this is just a beginning in an important field. If one could really find basic differences between normal and neoplastic glial cells, it might open a new field in brain tumor diagnosis and therapy.

DR. JORDI FOLCH: A point worth emphasizing is the exceedingly high oxygen consumption shown by oligodendrogliomas. Victor and Wolf published one observation and 18 years later Heller and Elliott reported exactly the same finding on another case.

DR. JOSEPH M. FOLEY: Is the metabolic rate correlated in any known studies with the period of time at which myelin is being laid down?

DR. ALLEN: In regard to Dr. Adams' question: The problem of histological classification is a difficult one and one that is troublesome. I think the best we can do is to try to decide what type or types of cell are present in each specimen studied. In the slide on the neurocytoma, that tumor was a mixture. Some parts seemed to be neoplastic glia, whereas some islands

had characteristics that suggested neurocytoma. By a lucky shot we hit an island where the cells seemed to be solely neurocytes. In regard to nuclear mass, we haven't been able to make any correlations with cell division. In the oligodendroglioma there were not many mitoses in spite of the active oxidase levels. It is not surprising that such correlations were not possible with the particular enzymes under study, since they are present in cytoplasm rather than nucleus. We are, however, hoping to obtain satisfactory methods for microdetermination of nucleoproteins and intend to investigate this point further.

Dr. Folch mentioned and made the interesting point that oxygen consumption in oligos seems to be excessive, far more than what one would expect from the cytochrome oxidase activity. This and other considerations led to the speculation that there may possibly exist in white matter and in oligodendrogliomas oxidative pathways involving enzymes other than the cytochrome system.

Dr. Foley's question: We have not been able to make correlations between oligodendroglia and myelin in the present study. In view of the possible relations of oligodendrocytes to the maintenance and the laying down of myelin, the possibility that normal oligos have a higher metabolism than other glia is most interesting. One wishes to look further into this.

BOOK REVIEWS

Blair, G. W. Scott. MEASUREMENTS OF MIND AND MATTER. (New York: Philosophical Library, Inc., 1956. Pp. 115. $4.50.)

In this small, lively written volume, the author, an English industrial scientist in dairying, who says of himself that for twenty years he has been "trying to measure queer things like the tilth of a soil, the strength of a flour and the body of a cheese" discusses the problem of measurement in the empirical sciences, both biological and physical. Scientific specialists are inclined to use available measuring scales without giving much attention to the logical and ontological bases of their measuring devices. The problem is treated as one outside the frontiers of specific sciences and is essentially a psycho-physical one. Most scientists do not even try to distinguish with accuracy between what is real in a measured dimension and what is but a result of abstract logical classification. He describes briefly some of the essential features, the similarities and differences, of spatial, psychological and physical dimensions of space and of time. The author points out that the scales and concepts of measurement cannot be the same in all sciences and that, e.g., physics and psychology (including psychoanalysis) need their own specific definitions of dimension and measuring units. We are far from a unified and universal theory and technique of measurement. Knowledge of higher mathematics is not necessary to enjoy and benefit from this valuable contribution to a fascinating and basic problem of all sciences.

ZAP

Opler, Marvin K. CULTURE, PSYCHIATRY AND HUMAN VALUES. Springfield, Ill.: Charles C. Thomas, 1956, 242 pp.

Psychology and psychiatry possess the good fortune to consist of subject matter boasting much intrinsic interest. It is in some measure for this reason that they have intrigued some of the leading thinkers in the allied fields of anthropology and sociology into attempting an articulation of socio-cultural levels of behavior analysis with psychological approaches. The latest contribution by one of these figures, M. K. Opler, exemplifies the enrichment which psychology thereby enjoys.

In this work Opler essays a delineation of the contours of the newly emerging interdisciplinary subject called social psychiatry. (A more neutral if awkward term like "social psychopathology" might help spare the area from those problems pursuant to the jockeying for power of the different professions.) The theoretical interrelations between culture and psychopathology are firmly stated. There is outlined a methodology which promises to locate important problem areas, to shed light on their nature, and, fortunately, to challenge the above theoretical suppositions. In the course of his exposition of theory and methodology Opler has also served the busy clinician by critically reviewing much of the literature in this rapidly growing field.

Although Dr. Opler marks the development and approves the abandonment of those anthropological systems built on the premise that types of social structure and interactional systems may be studied alone and apart from the psychological qualifications of the meanings of cultural conduct for individuals, his own theory is heavily weighted toward cultural factors. The lengthy history and omnipresence of cultural variables appear, for Opler, to overwhelm determinants emenating from the individual in the causation of behavior.

This position helps account for Opler's preference for the systems of Freudian revisionists, given their relatively easy meshing with cultural constructs. However, the facile lending by neo-Freudians postulates to a cultural viewpoint has its price. The consequent interdisciplinary science, although more quickly taking shape, heeds only that largely exterior part of personality which mirrors society's views. The individual is allocated no resources which enable him to appraise or overhaul consensual assessments of himself as well as of his significant persons. There is no acknowledgement of the continual normal subdividing of the self-structure wherein the varyingly reified segments busily carry on mutational proceedings, including critical evaluations, with each other as well as with

interiorized images of significant persons. It is true that this inside dialogue takes place in large part with symbols and even attitudes taken over from the culture. Nevertheless, the internal interchange may have its thematic issue, whether in creativity or pathology or conformity, at a point far from the locus which would be predicted by a conceptual system which simply assumes that the individual wanly reflects the socio-cultural system.

Despite the danger of the culture devouring the psyche in Opler's presentation, this natural theoretical inclination of the anthropologist proves a sharp challenge to the psychologist to clarify his own working assumptions. Better this kind of bent from a social scientist than that of the anthropologist who, with a proselyte's fanaticism, achieves an integration of social, cultural, and psychological frameworks by embrace of some single psychological factor as the prime mover of all action. This reader, for example, was made by Opler's underscoring of the contribution by cultural determinants to the making of people's problems, to think again about some features of masochism, e.g., the therapist's stress upon the "acting out" patient's own part in instigating his problems. If knowledge of the Italian slum sub-culture of a youth could forecast the probability of his becoming a delinquent, is there not something virtually immoral in the therapist piously stating to the "acting out" boy that he brings trouble upon himself? In the context of this inattention to socio-cultural forces by the therapist, we went on to contemplate the many radicals, who of course designed the change of our social system, departing this preoccupation with social change via the analyst's couch. We wondered about the role the therapist frequently assumes as a gatekeeper to legitimate middle class society and to middle class views for such gadflys. We recalled that Freud developed his theory in a society whose rigid suppression of deviant political views paralleled the late 1940's and early 1950's atmosphere of this country. In these recent years a personal analysis rather than political activity became the channel of self-maximisation. The only assertiveness bringing gratifications, the tenets of American psychotherapy imply, is that by the individual in his primary and non-political settings. But to cut short these meanderings—their upshot for the reviewer was that if there are (and there are) socio-cultural determinants of psychological and psychiatric conceptualization and of the derived therapeutic procedures, then certainly we would be well advised to become aware of them. In this way some choice may be obtained in the recasting of theory and application in a consciously desired direction.

Whatever Opler's theoretical biases in describing how personalities of societal members operate in a social and cultural context, the methodology which he adumbrates for the new discipline is one that can provide a corrective for any imbalance of basic causes. It is first necessary, Opler states, to study the history and the structure of the sociocultural system, especially as it provides reference points for 1) judging such features of behavior as the normative and the aberrant, 2) the intensities of affect, and 3) the use of cultural symbols in communications. (Only against the background of this social system of meanings can one later assess the patient's universe of meanings and experiences.) Hypotheses which emerge from the depiction of the socio-cultural system may then be tested by *incidence* rates of illness (or of any other behavioral phenomenon). Incidence rates call for the explicit designation of the age, sex, community, generation level, social class, etc., variables-for the given group, rather than the gross *prevalency* rates of the total society. Only incidence rates permit particularizing the destructive pressures of the socio-cultural system. The how and why of a given incidence rate, i.e., the subjective experience of the socio-cultural system's strains, are next to be grasped by psychiatric study of individuals. Combination of statistical epidemiological and individual-etiological research promises large strides in comprehending the transactions of the individual with the impinging forces of the socio-cultural system. Either research method alone can not be employed with any amount of certainty regarding any particular point.

Much of Opler's methodological discussion is justifiably directed against the correlation with rates of mental illness of such gross or global variables, singly used, as socio-economic status or population density. He continues his plea for specificity in the realm of psychological

functioning too. It is Dr. Opler's claim that interest in the pan-human mechanisms of psychological development has so far led into a blind alley. Opler selects as major targets the morally-toned and rigidly ordered theories of evolutionist sociologists of the nineteenth century. Unfortunately, there is no mention of the sophisticated analysis by Heinz Werner, for instance, of the constant dimensions of early, primitive thought levels as contrasted to fully developed mental functioning. In this reviewer's perusal of anthropological literature along such areas as magic, disease assessments, disease therapeutics, and even religion, the similarity of beliefs and practices the world over was found to be simply astonishing. This sameness suggests that the invariant imperatives of every socio-cultural order (viz., maintaining a system of order and constraint, setting up a hierarchy of prestige, securing and distributing material goods essential for existence, assigning significance to man's existence and his tie to fellow humans, supplying areas for tension release, training the young to assume adult roles, etc.) interacting with catholic human needs and universal characteristics of mental functioning produce a number of underlying uniformities in mental content and mechanisms the world over. Idiosyncratic behavior may be viewed as an emergent against a widely shared background of concordant mental structure and functioning. There is no reason why the methodology outlined by Opler could not also throw additional light upon such universals of human behavior. Perhaps only by knowledge of these ecumenical parameters can the influence of detailed socio-cultural variables or the signification of any unique behavior be fully appraised. But these divergences represent stimulating disputes happily provoked by the author along the productive path which he has mapped out.

STANLEY ROSENMAN

BOOKS RECEIVED FOR REVIEW

April, 1956

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DELAY, JEAN. *Aspectes de la Psychiatrie Moderne*. Presses Universitaires de France, Paris, France.

GOLDFARB, WILLIAM AND DORSEN, MARILYN M. *Annotated Bibliography of Childhood Schizophrenia and Related Disorders*. Basic Books, Inc., New York, N. Y.

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KIMBLE, GREGORY A. *Principles of General Psychology*. The Ronald Press Co., New York, N. Y.

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LINTON, RALPH. *Culture and Mental Disorders*. Charles C. Thomas, Springfield, Ill.

MACKAY, R. ET AL. *The Year Book of Neurology, Psychiatry and Neurosurgery, 1955–1956 Series*. The Year Book Publishers, Inc., Chicago, Ill.

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NOTES AND NEWS

MENTAL HEALTH GRANTS

The National Institute of Mental Health announces the award of three Mental Health Career Investigator Grants. The awards, totaling $46,310 for the first year, were recommended by the National Advisory Mental Health Council at its March 1956 meeting. Two additional career investigator grant applications with beginning dates after July 1, 1956, were recommended for approval and awards will be made from funds appropriated for Fiscal Year 1957. The purpose of the career investigator program, which was initiated in 1954, is to assist in opening up research careers to qualified young psychiatrists and scientists in related disciplines, by enabling them to spend 3 to 5 years in full-time research.

Thirteen New Research Grants have been awarded by the National Institute of Mental Health upon recommendation of the National Advisory Mental Health Council at its March 1956 meeting. The total amount awarded in new grants was $194,546. Six additional research grant applications with beginning dates after July 1, 1956, were recommended for approval and awards will be made from funds appropriated for Fiscal Year 1957.

The Advisory Council at its March meeting also approved the continuation of forty-five research grants, amounting to $753,801. The favorable recommendation of the Advisory Council, qualifies these grants for continued support by the National Institute of Mental Health.

1957 NATIONAL HEALTH FORUM

Dr. Leona Baumgartner, New York City Health Commissioner, in her capacity as President of the National Health Council, has announced appointment of Dr. Francis J. Braceland, Psychiatrist-in-chief of the Institute of Living in Hartford, Connecticut, and President of the American Psychiatric Association, as Chairman of the 1957 National Health Forum.

The 1957 Forum, one of an annual series conducted by the National Health Council in the interests of its 50 national organization members, will face the question:

"What changes must be made in American life to improve the mental health of our people?"

"Nine million Americans are suffering from mental illness serious enough to warrant treatment," said Dr. Baumgartner, "and half our hospital beds are occupied by mental patients. Those facts point to a problem of national emergency proportions. Everyone can and must assume some share of responsibility for prevention and control of such an epidemic."

The Forum will be held in Cincinnati, Ohio, March 20 and 21, initiating a plan to rotate it through different regions of the United States.

Representatives of education and religion, as well as varied health organizations, are being invited to join Dr. Braceland's 1957 Forum Committee which will hold an organization meeting in New York June 4.

THE THOMAS W. SALMON LECTURES

The twenty-fourth series of the Thomas William Salmon Lectures will be delivered Thursday afternoon and evening, November 15, 1956 by Horace W. Magoun, Ph.D., Professor of Anatomy at the University of California at Los Angeles. The subject will be "The Waking Brain."

Dr. Magoun is Visiting Scientist at the National Institute of Mental Health in Bethesda, Maryland. His current research interests are directed respectively to contemporary and historical aspects of the relations of the mind with the brain. In 1950 he took part in establishing a new School of Medicine at UCLA. The active program of interdisciplinary research set up at this university is attracting an increasing number of scholars from this country and abroad. Dr. Magoun has subtitled his lectures "The Role of the Reticular System in Wakefulness and Behavior." The lectures will be given at 4:30 and 8:30 P.M. in Hosack Hall of the New York Academy of Medicine in New York City.

New Officers of Illinois Psychiatric Society

On May 16, 1956 the following members of the Illinois Psychiatric Society were elected to office for the coming year of 1956–57:

President
Dr. Hugh T. Carmichael
30 North Michigan
Chicago 2
Vice-President
Dr. Kalman Gyarfas
6500 Irving Park Blvd.
Chicago 34
Secretary-Treasurer
Dr. Alberto de la Torre
612 N. Michigan
Chicago 11
Councilors
Dr. Roy R. Grinker
4940 S. East End Ave.
Chicago 15

Dr. George R. Perkins
6 North Michigan
Chicago 2.

THE ISAAC RAY LECTURESHIP AWARD

Dr. Philip Q. Roche, Philadelphia psychiatrist, has received the Isaac Ray Lectureship Award of the American Psychiatric Association, it was announced at APA's Annual Meeting here today. The Award is given annually to a lawyer or psychiatrist for contributing importantly to better understanding between the two professions.

As winner of the $1000 Award, Dr. Roche will deliver a series of lectures on psychiatry and the law at the University of Michigan, Ann Arbor, under the joint sponsorship of the law and medical schools there. These will later be published in book form.

Dr. Roche was Chairman of the Committee on Forensic Psychiatry of the Group for the Advancement of Psychiatry from 1948–1952, and has been a member of the APA Committee on Legal Aspects of Psychiatry since 1942. He has served on the Philadelphia Advisory Commission on Commitment, Detention and Release of Prisoners, and was a founding member of the Philadelphia Medical Legal Institute. His contributions to the literature include articles on "Relation of Syphilis to Crime," "Masochistic Motivation in Criminal Behavior," "Community Control of Sex Offenders," "Sexual Deviations," and many others. In 1952–1953 he conducted a seminar on psychiatry and the law at the University of Pennsylvania Law School.

A graduate of the University of Michigan Medical School, Dr. Roche is a Fellow of APA and a Member of the American Psychoanalytic Association. He is on the faculty of the University of Pennsylvania School of Medicine and the Philadelphia Psychoanalytic Institute. He was a founding member of the Pennsylvania Psychiatric Society and served as its President in 1952–53.

Dr. Roche is the fifth winner of the Award, the others being Dr. Winfred Overholser, Superintendent of St. Elizabeths Hospital, Washington, D. C.; Dr. Gregory Zilboorg, prominent New York City psychiatrist; Hon. John Biggs Jr., Chief Judge, U. S. Court of Appeals, Wilmington, Delaware; and Professor Henry Weihofen, College of Law, University of New Mexico at Albuquerque. The Award commemorates Dr. Isaac Ray, a founder of A.P.A., whose "Treatise on the Medical Jurisprudence of Insanity" published in 1838 was for many years the standard work on the subject.

$8.5 MILLION SLATED FOR MENTAL HYGIENE RESEARCH, TRAINING

Appropriations for research and training programs in the New York State Department of Mental Hygiene in the coming year, 1956–57, will total $8,474,929, representing an increase of nearly $3 million over the previous year.

The programs cover many new and expanded projects and represent an encouraging step forward in implementing the department's new nine-point pilot program, according to Dr. Paul H. Hoch, Commissioner.

Included in the overall appropriation is $2,342,237 for the department's special research studies and institution research programs. Incorporated in the special studies group are a newly established biometrics research unit, a cerebral arteriosclerosis study, a child psychiatry study, a chemical and toxiological laboratory, and integrated studies on schizophrenia.

Four new research units will be established this year under appropriations totaling $352,400 at Central Islip, Brooklyn and Hudson River state hospitals and Willowbrook State School. Other institution units are located at Creedmoor, Manhattan and Rockland state